



DISCOVERY

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Notes of the Month.

SIR JAMES JEANS, President of the British Association, in the message which he contributes to *Discovery* this month, emphasises the feeling that Science as a whole is on trial, and welcomes the opportunity given by the meeting of the Association for the advocates of Science to state the case for the defence. At the two previous meetings with which Aberdeen has been favoured insistence was laid on the connection between Science and the State, the keynote having been struck by no less a person than the Prince Consort. This year the case at issue is rather the relation between Science and the individual as a member of the State, and the orientation of the meeting has wisely and purposely been swung in that direction. Despite the world-wide depression research and scientific progress still go on; and the bottom of the valley having at last been reached without any slackening of scientific endeavour, the man in the street is beginning to realise that Science is perhaps a friend who will help him up the farther slope. It is the function of the British Association to assure him that his hopes and expectations are not without solid foundation.

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The main features of the sectional programmes this year are briefly discussed in this issue. The non-technical side of the British Association's activities is stressed even more than usual, for the excellent reasons given by Sir

James Jeans in his message on p. 243, and the co-operation of science in the life of mankind is the theme that runs through the whole programme of the meeting. The economy of Aberdeen and its neighbourhood naturally plays a prominent part in the work of Sections E and F and it is likely that extensive reference will be made to the change of local conditions since the last Aberdeen meeting was held in 1885. At the earlier meeting in 1859, when the Prince Consort occupied the presidential chair, the Association was in its adolescence and it was then given that impetus towards the assumption of a national character which is so important to-day when the future prosperity of the nation still hangs in the balance. Social welfare and economic recovery must be a principal aim of scientists to-day; and the Aberdeen programme reveals that our scientists are not unmindful. A full report of the meeting by our own correspondent will appear in the October issue for the benefit of readers unable to be present.

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The summer *Journal of the Marine Biological Association* (published at the offices of the Association at Plymouth; 19s.) reports an investigation by G. A. Steven into the habits of seals on the North Cornwall coast. During recent years Cornish fishermen have been complaining bitterly of the damage wrought by seals among their fisheries. The fishing communities claim that these animals rob their trammel nets and that they not infrequently disperse valuable shoals of mullet. Several trips made by boat along the coast from St. Ives revealed the fact that while the Brown Seal (*Phoca vitulina*) is now rare, Grey Seals (*Halichærus grypus*) are present in large numbers, a complete reversal of the state of affairs at the time of Lankester's observations in 1883. But although it was evident that the seals took the greatest interest in the movements of the herring fleet and that herring formed part of their ordinary diet, it was demonstrated that the damage done by them to the nets was negligible, and no direct proof was obtained that they actually removed fish from the nets. It would scarcely appear desirable,

therefore, that the threatened extermination of the Grey Seal on the Cornish coast, whether by extensive netting or by clubbing large numbers of them to death, should be encouraged by money rewards.

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Two hot summers in succession and (apparently) a highly efficient press-agent have brought into unpleasant prominence the usually retiring *Cimex lectularius*. Travellers in less temperate lands have many tales to tell of the ravages of this revolting insect; and the late Sir Arthur Shipley himself confessed to having been completely routed on one occasion by the determination of its quest for blood. But hitherto in this country (in recent years at any rate) the bed-bug has existed in obscurity—or so we thought. It now appears that this obscurity was only a relic of Victorian mock-modesty—bugs ought not to exist, therefore they did not—and now *Cimex* has become a real problem even on the newest housing estates. Mr. Nicholson's article in this number encourages the growing of pyrethrum as an insecticide; and it would be interesting to have recent reports of the results of applying pyrethrum preparations to the crevices and crannies of old furniture, and so on, as a means of discouraging this pest in new buildings. The application is at all events easier and safer than that of the "official" hydrocyanic acid.

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In the month of August, 1934, there steamed into the St. Lawrence river the S.S. *Champlain*, bearing a delegation sent by the French Government to share in the celebration of the four hundredth anniversary of the discovery of Canada by Jacques Cartier, sea-captain out of St. Malo. The journal *Quebec* publishes a stirring account of Cartier's voyages: his sighting of Newfoundland, already discovered by Verazano; his passage of the Straits of Belle-Isle; and his landing in mid-July in Gaspé Bay, on the mainland shore. Cartier chose this route in the hope of discovering a western passage to the Indies; but his primary object was the evangelising of the natives, and it is in commemoration of the first effort to implant Christianity on Canadian soil that a Cathedral of Remembrance is to be built at Gaspé

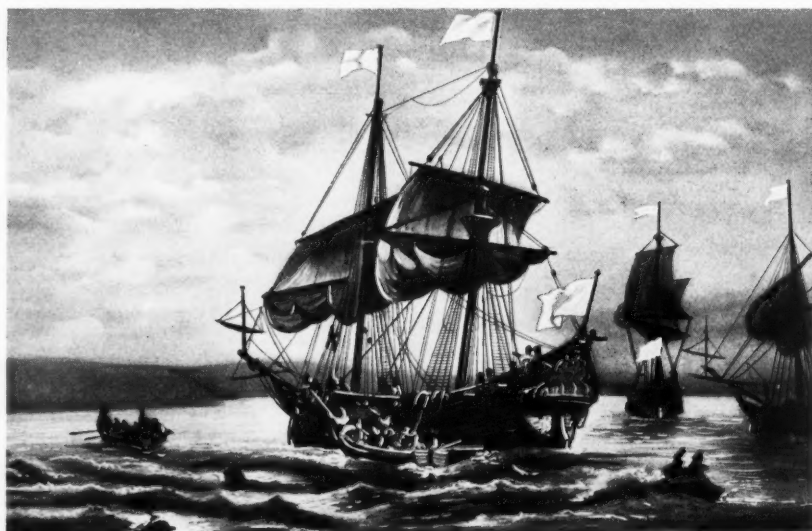
Basin. Though under a new flag, the Province of Quebec has always retained much of the spirit of Old France; but her sons are true Canadians—the names of Lafontaine, Georges Cartier, and Laurier rank high in the annals of Canadian progress.

* * * *

Senator Marchese Marconi is devoting attention to the application of micro-rays as an aid to safe navigation in fog. His yacht *Elettra* has been engaged in experiments in the Gulf of Genoa with this object in view. The apparatus being tested is designed to allow ships to enter even small ports under the worst conditions of visibility. According to a statement made by Marchese Marconi to a representative of the Turin *Gazzetta del Popolo*, and recently reported in the *Electrician*, the captain of the *Elettra* was able during a recent trial to steer between two buoys moored close together without being able to see them. The micro-rays used have the great advantage of freedom from disturbance by other wireless transmissions, atmospheric or electrical machinery. Marchese Marconi expects shortly to be able to give an official demonstration of the apparatus used.

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"Radiolympia" opens as we go to press. The Show will be visited by our Special Correspondent, and his notes on new wireless developments will be reported in our next issue. Press comment points to improvements in superheterodyne receivers and the construction of models available for use on either alternating or direct current electric mains.



Cartier's Caravels ascending the St. Lawrence.

(By courtesy of the Agent General for Quebec).

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The Aberdeen Meeting of the British Association.

By Sir James Jeans.

President of the British Association for the Advancement of Science, 1934.

We are again privileged to publish in our British Association number a foreword contributed by the President. In contrasting the position of Science to-day with that which it held at previous Aberdeen meetings, Sir James Jeans raises the fundamental question: What is the real value of Science to Humanity?

ON September 5th the British Association will assemble in Aberdeen for the third time, after an interval of 49 years. The first Aberdeen meeting was in 1859, under the Presidency of the Prince Consort. All the Scottish meetings of the Association have been noteworthy, but this particular meeting was especially so. For the President dealt in his address with a subject on which he was known to feel strongly—the relations between Science and the State—in words which may seem ordinary enough to-day, but struck something of a new note in 1859. He summed up his main position in the words:—

"We may be justified in hoping that by the gradual diffusion of Science and its increasing recognition as a principal part of our national education, the public in general, no less than the Legislature and the State, will more and more recognise the claims of Science to their attention; so that it may no longer require the begging-box, but speak to the State, like a favoured child to its parent, sure of his parental solicitude for his welfare; that the State will recognise in Science one of its elements of strength and prosperity, to foster which the clearest dictates of self-interest demand."

The President, Sir Lyon Playfair, of the second Aberdeen meeting in 1885, had more to say on the same subject—indeed, he took the words of his distinguished predecessor quoted above as the text of his presidential address.

Within the last few years the whole question has assumed a new aspect. There has been a gradual awakening of the public mind to the practical and utilitarian value of Science to the individual, to the industrialist, and to the State, conspicuous landmarks being the general realisation of the important part played by Science in the war, the creation of the Department of

Scientific and Industrial Research as the war drew to its close, and the creation and fostering of industrial "Research Associations" by this Department.



Sir James Jeans.

[Elliot & Fry]

The clouds of economic depression have perhaps produced some cooling of this favourable atmosphere, and the last two or three years in particular have witnessed a tendency in certain quarters to question whether Science has not overreached itself. Even its most ardent advocates have to admit that its gifts are mixed, in the sense that they may be used for evil purposes as well as for good—to destroy in war as well as to heal in peace, to displace labour as well as to provide employment—and we hear sincere doubts as to whether the very rapid progress of technical science in the last few years has on the whole been to the advantage or disadvantage of the community.

Is Science the friend or foe of humanity? Would it be to the

public good if all scientists could be put to sleep and all scientific investigation suspended for a term of years? Do the new methods of increasing agricultural production which Science has taught tend to the advantage or disadvantage of humanity as a whole? To what extent is the tragedy of our present unemployment associated with the continual outpouring of labour-saving devices by engineering research? Would the world be a happier place—or would England be a happier country—if, like the Erewhonians, we broke up our machinery and proclaimed invention a crime?

These are questions which all the traditions of the Association urge, and indeed compel, it to face. Its programmes have never been limited to purely scientific discussions, but have always included a liberal proportion of items of general public interest. Such questions as the foregoing, with their implied doubts as to the value of Science, will no doubt be in the minds of many at the Aberdeen meeting. I hope they will be

faced without flinching, and discussed in terms which the public can understand. There can, I think, be no doubt as to what the general answer must be. Indeed, even since the questions were first mooted there has, I think, been a marked change in the public attitude. There is less of a tendency to regard scientific research as the culprit in the dock, and more to turn to it for remedies in our present economic difficulties. In response to a clearly-voiced demand, the Aberdeen programme has been drafted in such a way that even more attention than usual will be given to such matters.

General and Sectional Meetings.

The inaugural general meeting will take place at 8.30 p.m. on Wednesday evening, September 5th, when Sir James Jeans, the President, will deliver an address on "The New World-Picture of Modern Physics." The evening discourses include a Memorial Lecture for the late President, Sir William Hardy, who died during his year of office; this will deal with the preservation of food, a subject in which the late President was deeply interested. Professor W. L. Bragg will deliver an evening discourse on "The Exploration of the Mineral World by X-rays." The Corporation will hold a reception in the Art Gallery buildings on September 6th, and it is hoped that the University will give a garden party on September 11th. The country around Aberdeen offers many opportunities for specially attractive excursions, and for Saturday, September 8th, trips to Inverness, Morayshire, Deeside, the Grampians, etc., have been planned.

Sectional Presidents.

The Sections of the Association will begin their sessions on Thursday morning, September 6th, and will continue daily (except Saturday) during the meeting. The social aspect of Science is stressed as far as possible throughout, as will be seen by the subjects outlined in the Preliminary Programme. Co-operative research is the keynote of the presidential address in the Geography section; in the Engineering section the development of inventions as a stimulus to economic recovery is being treated; the industrial uses of timber occupy the attention of the Botany section; and rural industry as affected by scientific progress is dealt with by the Agriculture section—everywhere Science is invoked as a support for the weaknesses of humanity.

Professor H. M. Macdonald, President of Section A

(Mathematics), is Professor of Mathematics at Aberdeen University and formerly held a lecturer's chair at Cambridge. In Section B (Chemistry) the President is Professor T. M. Lowry, who has held the Chair of Physical Chemistry at Cambridge since 1920. He has been President of the Faraday Society and was a member of the war-time committees of Trench Warfare and Chemical Warfare; perhaps his best known publication is "An Historical Introduction to Chemistry." Professor W. T. Gordon, President of Section C (Geology), is Professor of Geology at the University of London, King's College, and is secretary of the Geological Society. Section D (Zoology) is presided over by Dr. E. S. Russell, well known as Director of Fishery Investigation at the Ministry of Agriculture. In Section E (Geography) the President, Professor A. G. Ogilvie, is especially interested in Hispano-American geography; he has been Professor of Geography at the University of Edinburgh since 1931. Professor H. M. Hallsworth, who holds the David Dale Chair of Economics at Armstrong College, and has published a well-known treatise on the Elements of Railway Operating, is the President of Section F (Economic Science and Statistics). Professor F. G. Baily, President of Section G (Engineering), is Emeritus Professor of Electrical Engineering at the Heriot-Watt College, and has been consulting engineer to many public bodies. Section H (Anthropology) is presided over by Capt. T. A. Joyce, well known for his expeditions to British Honduras; he is Deputy Keeper of Ethnology at the British Museum. In Section I (Physiology) the President is Professor H. E. Roaf, George Holt Professor of Physiology at Liverpool University since 1932, who is known for his "Text Book of Physiology" and various biochemical and physiological papers. Dr. Shepherd Dawson, President of Section J (Psychology), has been Director of Glasgow University Psychological Clinic since 1927.

Professor A. W. Borthwick, Professor of Forestry at Aberdeen since 1926, and late Chief Research Officer to the Forestry Commission, takes the presidential chair in Section K (Botany). Section L (Educational Science) has as President Mr. H. T. Tizard, Rector of the Imperial College of Science and Technology since 1929 and Chairman of the Aeronautical Research Committee since 1933; he has been Secretary of the Department of Scientific and Industrial Research. Professor J. A. S. Watson, President of Section M (Agriculture), has been Sibthorpe Professor of Rural Economics at the University of Oxford since 1925, and before that was Professor of Agriculture at Edinburgh; he is joint author of "The Science and Practice of British Farming."

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Wireless and the Farmer.

By Sir John Russell, D.Sc., F.R.S.

Director of Rothamsted Experimental Station, Harpenden.

Townsmen have come to consider wireless as scarcely more than a pleasant little luxury. Sir John Russell shows that for the farmer it has become a necessity of life, if life is to be more than a mere drudgery. He suggests a scheme of development that should have the support of all men of good will.

It is difficult in this year of grace 1934 to recall the isolation of the villages and still more of the farmhouses of 50 years ago. There were of course no motors and no bicycles—the old high machines of those days hardly penetrated into the countryside, and in any case they were not used by farmers. The dog-cart was the means of conveyance for the active men and the pony trap or carriage for the others. The weekly market day was the occasion for the farmers to meet together for business and conversation; after the work was done there was the lunch at the inn, the “farmers’ ordinary” as it was called, a few friendly drinks, and then home. If the few drinks had expanded somewhat it made no difference, for so long as the man could sit up in his dog-cart the old horse could be trusted to take him home. In the evenings the isolation was almost complete; now and again some outburst of activity would set the parish humming with excitement: occasionally there would be something at the Chapel, or the curate might organise a “penny reading,” but there was very little doing and when the darkness came there was nothing for it but to go to bed. The labourers in their cottages grouped about the village green might go to the ale-house for cheer and company but the farmhouse was usually too far off.

The Bible or the Bottle.

The day’s work in the open air made it difficult for farmers to read even if they had been so disposed. Most of them read but little; what they did read, however, was good, often far better than what is read to-day: the most widespread and widely read books were the Bible and the *Pilgrim’s Progress*. Books on agriculture were few, though, curiously enough, an older generation seems to have read, or at least to have bought, more agricultural books. But apart from the Bible and *Pilgrim’s Progress*, literature, the drama, music, art, science, all lay right outside the path of the ordinary farmer, and there was no means by which they could ever be brought to him, or he to them.

There were many farms where during the long evenings there was so little to do that merely to escape the boredom the farmers took to drinking far more than was good for them. It is useless to blame them: what else could they do?

The development of “wireless” has changed all this completely. When the day’s work is done the farmer can come home and have his evening meal—often the principal meal of the day; he can settle down in his comfortable chair to a pipe, and “turn on” the wireless to a variety of programmes according to his taste. He is provided with a pleasant way of spending his evening, but, far more important, he completely loses that sense of isolation and feels himself one of a group of listeners to whom the programme is being addressed.

Companionship and Advice.

To a little lonely group this is all very pleasant: it is the voice rather than the speech that counts, and it is this that explains the survival of systems in some of the overseas countries where the programme is largely in the hands of advertisers.

The farmers of this country, however, get a good deal more than a voice. From the point of view of their daily work they have the advantage of being able to hear things that should be known at once to them: such as price movements, weather reports, harvest conditions and prospects, and any other communications the Ministry of Agriculture considers should be made. On the regional programmes they can listen to men with considerable knowledge of the local problems who can give technical talks of great value, which can of course be more detailed, and therefore of more direct practical application than would be possible for a national programme; for, quite apart from any consideration for the urban listener, the farming of this country is so diverse, and the interests of the different groups of farmers so widely separated, that it is impossible in a single talk to say anything that will be of direct practical use to more than a small fraction of the agricultural listeners.

The educational value of wireless to the farmer has, however, not been confined to the giving of information of direct application to his daily work. Many of the agricultural talks have set farmers thinking, even though the subject matter was not directly applicable in their own particular conditions. Experiences of other men such as A. G. Street; talks by agricultural experts concerned with the devising and testing of new methods or with the discovery of the principles underlying the

old ones; talks about marketing and other schemes under consideration for putting into operation; all these have widened the farmers' horizon and set them talking and thinking.

The Countryman no Longer a "Rustic."

Whether as a result of this or whether quite an independent phenomenon it is not possible to say, but simultaneously with the spread of wireless there has appeared a new mental activity in the countryside. In recent years agricultural discussion societies have sprung up in many parts of the country and they have attracted numbers of young men connected with farming who meet together under the guidance of some leader for the discussion of agricultural problems. Technical matters of local importance naturally figure largely in the programmes, but they by no means completely dominate the activities of the groups. I have lectured to a number of them, and so have other members of the Rothamsted staff, and we have always found them alert and interested in the wider agricultural problems because they realise that the methods of to-morrow will not be those of to-day and the wider the range of their mental vision the better their chances of adapting themselves to the new methods they will need later on in the rapidly changing conditions of British agriculture.

Wanted, A Leader.

These discussion societies could, I believe, be greatly fostered and actively helped by definite courses of special wireless talks. In the main these would have to be regional, because the societies must deal with regional problems. But as an integral part of the scheme there should be periodical national talks by one of the leaders of agricultural science or practice, fitting in with the general courses though with very wide liberty of digression. Something on the basis of the group system would probably serve, modified of course to suit the special conditions of agricultural discussion societies meeting in village halls or schools. The fact that many country schools already listen to wireless talks with great advantage to both teachers and scholars, would of course solve a number of problems at the listener's end; and the further fact that a growing number of the listeners would be of the generation of young people trained from their school days to listen to systematic courses given by unseen speakers through the medium of the wireless would solve many difficulties now felt by listening groups.

One hopes that the discussion societies will prove the means whereby definite continuation courses could be given to rural classes. Hitherto the difficulty has been the provision of technically qualified teachers: this can now be largely overcome by wireless talks and the course

would need only its enthusiastic leader—a difficult requirement, but by no means insuperable.

There is, however, a much wider influence that wireless talks are exerting in the countryside. Anyone visiting farmhouses to-day must be struck by the good standard of education of the young people, particularly of the daughters of the house. They have usually been sent away to county or other good schools where the standard of work is quite high, and many of them come back home with a taste for good books and a sufficient knowledge of history and of literature to be able to appreciate something of the modern intellectual movements and to take an interest in them. The county library, one of the best things in modern rural life, provides the means for maintaining these tastes after the return home, but some regular stimulus is needed from outside: some way of suggesting whom of all the immense crowd of writers and of artists could well be studied by persons whose time and opportunities are limited. Probably in the end one of the greatest boons of the wireless to the farmer will be that it has served to keep alive in the younger generation the taste for good reading implanted and fostered at school by some devoted teacher. From my talks to farmers and their young people, and from the keen interest that I know is taken by many of them in books, I feel convinced that there is a considerable desire in the countryside for more education, not only technical but also general, than is now easily obtainable. The good work done in the elementary schools and in the county schools is beginning to tell, and the young people on our farms are alert and intelligent, ready to take all that life can give; they are free from many of the noisy and disturbing factors that prevent the town child from thinking.

New Light for the Townsman.

Finally the wireless talks on agriculture and country life have already greatly helped farmers by giving the townsman a better feeling of sympathy with the difficulties and problems of food production. The old idea of the townsman that the farmer is rather incompetent and a confirmed grumbler has largely gone: he is recognised as a struggler who must be helped since his failure would involve the towns in disaster. For the first time in our history the townsman is agreeing to drastic restrictions on the free importation of foodstuffs from overseas—all in the hope of keeping British agriculture solvent and enabling the farmers and the farm workers to remain in the country and not to come trooping into town looking for work.

These are some of the advantages already conferred by wireless on the farmer. It is, however, only at the beginning of its development and no one can yet see how far it may go.

The Secrets of a Periodic Lake.

By F. S. Copeland.

The periodic Lake of Cerknica is among the most famous of the many curiosities of northern Yugoslavia. The level of its intermittent waters depends on the level of a huge underground reservoir formed by streams percolating through the porous limestone of the Kras. Mrs. Copeland, who is Lecturer in English at Ljubljana University, puts forward the newest explanation of the hidden movement of the waters by which the lake is fed.

ONE of the most interesting regions of Europe, scientifically speaking, is the limestone country which the Germans call Karst, and the Italians Carso. It extends from Istria south as far as Montenegro, and as the native population throughout the length and breadth of it is Yugoslav, I prefer to call it by its northern Yugoslav name of Kras. In the south they call it Krš (Krsh). Sun-burnt and wind-swept is our Kras. Eternal blue haze broods over its level, shallow valleys, while the air above is crystal clear. Bracing in summer, bitter cold in winter when the *burya*, the north wind, has an innings, is our Kras.

Typical of Kras regions are the underground rivers; the cave systems that result from the burrowing action of these waters (described by the author in *Discovery*, May, 1930); the circular dells and hollows called *doline*, mostly due to the ultimate subsidence of caves; and finally, *polja*—i.e., fields (singular, *polje*)—which are flat plains ringed about by what appears to be a continuous girdle of hills or mountains, but is really the true level of the country. Some of these *polja* are periodic lakes, the most interesting and puzzling of all the problems of the Kras. During the summer months the lake beds are dry land, often very fertile in contrast with the surrounding stony and arid upland. Here and there the ground is pitted with holes—funnels blocked at the bottom with waterworn stones, or opening into a shaft that leads to unplumbed depths underground. Early in autumn water rises from certain caves and holes at the upper end of the *polja*, sometimes so abruptly as to spout like a fountain. The green plain becomes a lake and remains one throughout

the winter months and far into the spring. Then, as summer advances, the water ebbs away as mysteriously as it rose.

The best known as well as the most accessible and probably the most beautiful of the periodic lakes of the Kras is that of Cerknica, near the Italo-Yugoslav frontier, five miles from the frontier station of Rakek, on the Paris-Belgrade line. It can also be conveniently visited from Ljubljana, the pretty capital of the Drava Banovina, in the north-west corner of Yugoslavia. It is, incidentally, a very pleasant place in which to spend a day in the open air in spring or autumn.

As I saw it on my first visit, on Whitsunday, 1929,

the lake of Cerknica was the largest sheet of water in north-west Yugoslavia, some six miles long and over two in width, beautifully framed by the surrounding highlands. In the west rose the dark mass of the forest-clad Javorniki, and beyond that a maze of wooded hills that looked as if man had never yet encroached upon them. On the eastern side the ground was open; cultivated slopes were dotted with farms and villages nestling amid blossoming orchards at the foot of Slivnica, a long-backed, flat-topped moor about 3,800 feet high. Three islands broke the tranquil expanse of water: Mala Gorica is only a tiny rock, Velika Gorica a wooded hillock off the western shore; Otok (Vurnek, Venetke), at the southern end, is large enough to accommodate a small village and orchards. The two larger islands are connected with the mainland by causeways about five feet high.

As we made our way along the rugged western shore, we noted *estavelles* (famous among speleologists)—water-holes that act as



The Lake of Cerknica and the Kras of Inner Carniola.

feeders in the wet season or after heavy rains, and as drains whenever there is want of rain. Just then, little streams were rushing out of the lake, each to the nearest water-hole, and vanishing down it like water let off from a bath. Wonderful shell beaches lined every bay and inlet on the western shore. There shells by the



A typical beach of "dead" shells, with *Limnaea* especially prominent.

myriad are washed up by the waters returning from the deeps, where the banks of underground rivers are composed of nothing but shells, dead and empty and unceasingly scoured and battered by the streams of the cave world. The most remarkable varieties are *Limnaea stagnalis*, *Bythnia tentaculata*, and *Viviparus conlectus* (var. *carinolicus*). Mixed with the shells was debris from the reed beds that cover a large part of the southwestern part of the lake, and miscellaneous rubbish of the sort that everywhere finds its way into the water. Although we dug down over twelve inches we failed to find underlying soil.

Otok, the largest island, looked idyllic that late spring day—all green meadow and blossoming cherry trees, framed in a background of dark spruce; but there was not a soul astir upon it. At least so it seemed when we shouted for someone to ferry us over. After an unconscionably long wait our cries produced a response from a troop of small children who scuttled down to the shore and pushed off one of the island craft (it took about eight of them to do it). The three biggest came across in a very primitive and clumsy punt; but our infant crew, with a skipper who looked about ten, handled her in a most capable and experienced fashion. Apparently the adult population of Otok consists solely of decrepit old men and women. This is not the only village of Inner Carniola where every able-bodied man and woman has left home in order to earn money more easily elsewhere. At a very humble inn we raised food

for a midday meal. There was buckwheat bread, good milk, both sour and fresh, home-made smoked sausage, cheese, tart wine of the country, and bottled beer.

We left Otok by the dyke that connects it with the southern lake shore. A large stretch of the upper, southern part of the lake was fast turning into grassland. Everywhere we saw tiny trickles of water scurrying away to the nearest underground opening, or simply sinking out of sight, and we felt as if we were standing in an enormous sieve. The main streams were still rivers, and the ground was so sodden that we were glad of the dyke that cuts across the lake end to the road skirting the eastern shore.

Two years passed before I revisited Cerknica. This time my lake was not a lake at all. The northern part of the plain was rich meadowland, where grazed large, cream-coloured cattle of a local breed. The shell beaches were hidden under rank paludine vegetation, *Senecio paludosus* being plentiful, also a lovely, intensely blue field gentian. All the water holes were dry, except for a permanent spring or two, and here and there a belated thread of water trying to find a funnel. The dykes were high and dry, the islands little hillocks that somehow looked stranded in that unnaturally level green plain, with never a tree, nor a house, nor even a barn or shed to break the monotony.

The size of Cerknica Plain (or Valley) is about eight miles by four. The lake at high water may be as much as seven miles long and three wide. The altitude of the *polje*, or plain, is 1,800 feet. Dr. Jože Rus, a great authority on the subject, says that the surface of the lake "attains at the most an altitude of 552 metres." This would make the average lake depth a bare eight feet, which is corroborated by the fact that the dykes that cut across the lake and give access to the islands of Otok and Velika Gorica at all seasons except high water are just about five feet high, perhaps six in places. In pools and depressions the water is, of course, much deeper.

The lake is rich in fish (mainly pike and various kinds of *Cyprinidae*, or carp), and seems to have been much more so in the past. When the waters subside in summer, the fish are forced to congregate in fast-shrinking pools, where they are easily caught wholesale with a local type of landing-net.

Generally speaking, the lake fills once a year and empties once a year. But in exceptionally wet years it may not run dry at all, and in very dry years it may never fill. If it dries up too early in the season, it may actually fill twice in one year. It has long been known that local rain or snow does not affect the volume of water very much, but a wet or dry season throughout the countryside does. Another peculiarity of the lake

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is that it takes only about 900 hours, or a little more than a month, to fill, especially if the season be a wet one; whereas it requires about three months to drain. But the main problem so far has been to determine whence come the vast quantities of water that rise suddenly from the feeders and *estavelles* of the lake. A second problem is, where do they go when they sink out of sight? The key to these enigmas is to be found in the geological history of the region.

In the Tertiary Age this part of the Kras was buried under a continuous layer of flysch,* a kind of marine deposit which holds water. The watershed between the Adriatic and the Black Sea in this part of the world passed over the crest of the Javorniki, the comparatively lofty range west of Cerknica Plain. A tertiary Piuca (parent of the Piuca or Pivka of the Postumia Grottoes) flowed west from these mountains and into the Adriatic. A very much larger and more powerful Ljublanica rose a little beyond Lož, south-east of Cerknica, and flowed down a wide shallow bed directly north into the Ljubljana Plain. From there its lower course coincided with that of the present Ljublanica, only at a higher level. These rivers flowed normally on the surface over beds of Eocene flysch and dolomite. Later on in the Tertiary Age, a period of relative stability was followed by one of upheavals and convulsions, which caused, incidentally, the subsidence of the present



The lake-bed empty in the height of the dry season.

Ljubljana peat bog at the head of the Ljubljana Plain. Hereby the flow of the Upper Ljubljana became enfeebled and irregular, with the result that the river began to erode unevenly. Wherever the river bed was flysch or dolomite throughout, erosion proceeded gradually and normally; but where the water wore its way down to limestone, its bed collapsed, and the river

* Flysch consists of sandstones and marls. It is a marine Eocene formation deposited in the Pannonian Sea. It does not occur in England.



Primitive craft in use on the ferry to Otok, which is seen on the right.

began to burrow underground. This process led to the geographical and geological conditions of to-day. Instead of one continuous wide river-bed at an altitude considerably above the present depressions, the water gradually wore out a string of typical Kras valleys, or *polja*, from that of Lož to what is left of the old peat bog above Ljubljana.

At the head of Cerknica Plain, a little above the present high-water mark, is the Jezerski Obrh (*i.e.*, lake-top), the principal feeder of the lake, together with a few minor openings, through which the waters from the Lož Valley pour into the lake at filling time. Above the feeder caves, higher up on the hill-side, yawn dry caves—proof that at one time the lake surface was considerably higher than it is now. The chief immediate recipient of the Cerknica waters is the erratic River Unec (the same as the Piuca of the Postumia Grottoes), which plays hide and seek about Planinsko Polje, several miles north of Cerknica and 300 feet lower down. But the amount of water derived from the Lož Valley is not enough to account for the great volumes that periodically form the Lake of Cerknica, nor for its independence of local precipitations. Many and strange have been the theories put forward to explain these phenomena, which are closely linked with the history of the Ljublanica, although we must look literally below the surface to find the connection.

The changes wrought during the periods of upheavals and shiftings of strata in the later Tertiary Age were not confined to the course of the prehistoric Ljublanica. Enormous beds of limestone were thrust upward over the flysch and dolomite that had formed the surface where we now have the Carniolan Kras. In the Javorniki these limestone strata attained a height of 4,220 feet; in Mount Snežnik they were piled up to 5,890 feet. Only on the western slopes of these massifs the original

formation remained. Thus a large area of limestone became enclosed in a huge funnel or casing of impermeable flysch and dolomite. A typical Kras pocket was formed, and, incidentally, the watershed between the Adriatic and the Black Sea shifted from the Javorniki to the Snežnik (the Italian Monte Nevoso). Hereby the entire river system of the Piuca was diverted from its allegiance to the Adriatic and has ever since flowed (mainly underground) in a north-easterly direction, sending its waters, through the Ljubljana, Sava, and Danube into the Black Sea. And whereas the tertiary Piuca had been a normal surface river, this new Piuca became the burrowing Kras water of our own age.

The Hidden Reservoir

The plain or valley of Cerknica is therefore not merely a depression representing a fragment of a prehistoric river bed. It is part of a hydrographic zone which was at one time very much enlarged in area by the removal of the watershed from the neighbouring Javorniki to the more distant Snežnik, and at the same time enriched by the acquisition of the river system of the Piuca as well as the waters of Inner Carniola up to the barrier of impermeable flysch on the western and southern slopes of the Javornik and Snežnik massifs. The full significance of this becomes clear when we realise that the rainfall in Inner Carniola is exceptionally high. The annual mean is 59 inches, and on Snežnik it may be as much as 130 inches. All this water falls on permeable Kras limestone and finds its way into the underground caverns of the Inner Carniolan Kras enclosed in its funnel of impermeable flysch and dolomite. It is there, in the heart of the uplands of Inner Carniola, that we must look for the mysterious store of water that rises periodically until it fills the basin of Cerknica to a level determined by the laws of hydrostatics. This level is conditioned largely by the lowest point in the dolomite barrage at Planina, which is the northern limit of this Kras water-reception area of some 350 square miles (25 miles at its greatest length, and 18 miles at its widest). Dr. Rus compares this area to an enormous pan, with a chip in the rim at Planina. Periodically great volumes of water are dammed back behind the chip, so that they rise more than 300 feet and percolate through the floor of Cerknica valley. At such times over 7,000 acres of the flood area are submerged.

The axis of the depression of Cerknica lies along a fault in the limestone strata which extends in a line from Caporetto in Italy and through Rakek on the Yugoslav frontier. The north-eastern side, from a point near Planina to Dolenje Vas, is on dolomite. This explains the phenomenon of three different types of

water holes on the western side of the lake bed. There are "spouters"—i.e., feeders; "swallowers"—i.e., drains; and *estavelles*, which are both feeders and drains, according to season. The eastern massif of Javornik is all Kras limestone, and these *estavelles* are openings of cave shafts or cylinders within the mountain. At least, this is the latest theory concerning them. When these shafts are full to overflowing, water bursts from them as from a syphon and flows into the lake. Conversely, when the water in the shafts falls below the level of the lake surface, the *estavelles* act as drains. The largest of them is the Suhadolnica ("little dry valley") in the north-west corner of the plain. Fourteen large water holes are recognised in the lake bed and entered in the maps. Each has its own particular name, usually suggested by some peculiarity about it. Thus two water holes in the Zadnji Kraj, the south-western lake arm, are called Velika and Mala Bobnarica, which means Big and Little Drummer, because of the noises that issue from their underground recesses.

The great swallowing caverns lie at the lower, north-western edge of the plain. The most important of them are the Velika and Mala Karlovica, the Great Karlovica being the chief outlet of the lake. Even in the dry season a remnant of the main stream, a pool or short reach of water, collects at the mouth of this cave.

A Stygian Voyage

As the valley of Cerknica is of more use to the farmers of the district in its dry state than as a lake, efforts have been made for some time past to expedite the ebb of the waters, which is disproportionately slow. To this end the orifice of the Velika Karlovica has been artificially lowered by excavation, and the cave cleared for some distance of rubbish. In August, 1931, I was fortunate in being one of the first party of tourists to visit the famous grotto in its newly-cleared condition. Gradually the water burrows deeper and deeper into the limestone until it is held up by the clay which is the ultimate product of its own action. There are plenty of stalagmites and stalactites, mostly disfigured by thick coatings of mud as the cave is still a regular aqueduct.

In so far as the clearing of the Velika Karlovica is merely an assisting of nature in her annual process of draining the lake, it is a legitimate and safe proceeding. But an attempt to do anything towards draining off the water as fast as it runs in, and so to prevent the plain from becoming a lake at all, is a very different proposition and fraught with risk. Quite probably the first result would be a permanent submersion of the beautiful and fertile Planinsko Polje (Planina Valley) farther down; and, incidentally, the disappearance of the lake would deprive the district of its chief tourist attraction.

A New Crop for British Growers.

By E. P. Nicholson.

The author describes a valuable double-purpose crop on which extensive research is being undertaken. Although long grown abroad, it has only lately been commercially produced in England and offers interesting possibilities.

MANY British farmers and growers are unaware of recent advances in pyrethrum powder production, and of the suitability of the plant itself for cultivation in England. Yet almost certainly crops of pyrethrum (*Chrysanthemum cinerariæfolium* Trev.) will soon be important assets to countries where they are grown well. Comprehensive trials in southern, western and eastern parts of England suggest they would be profitable to individual growers in this country.

Japan has been a pioneer in this matter. Starting to raise pyrethrum in 1884—28 years after France, 24 after Switzerland and Germany, and 12 after Australia first tried it—Japan now grows and exports between 70 and 80 per cent. of the world's supply. The remainder comes mainly from countries on the Adriatic's eastern shore, where *C. cinerariæfolium* is indigenous. These are the former Croatia, Herzegovina and Dalmatia, now provinces of the Kingdom of Yugoslavia. But there are plain indications that the expansion of areas under this crop which made possible Japan's increase of export is about to be repeated elsewhere.

To make clear the present international interest in this insecticidal flower, and the reasons for anticipating development of its cultivation in many countries, it is necessary to review its record before and since scientific discoveries removed its production from the region of haphazard empiricism into that of exact processes. It should first be said that perhaps the greatest factor in creating this interest is that, whereas such insect-controls as Derris root (*Derris elliptica*) and Barbasco (*Lonchocarpus nicou*) are definitely exotic, pyrethrum is at home almost anywhere in the temperate zone.

The First Insect Powder.

Knowledge of the plant starts with a legend of a mediæval Persian peasant's observation of dead flies under bunches of withered pyrethrum flowers. Certainly it is as "Persian Insect Powder" that it first appears in recorded history, and the peoples of Eastern Europe were using it a century ago; while about 1818 a Persian merchant began to make it on a large scale and export it to Western Europe. This was probably the dried, powdered flowers of *C. carneum* Bieb., or *C. roseum* Bieb., which, found wild in the Caucasus and Persia, formed bases of early insecticides; they are now almost entirely superseded for commercial production by those of *C. cinerariæfolium*, the properties of which have long

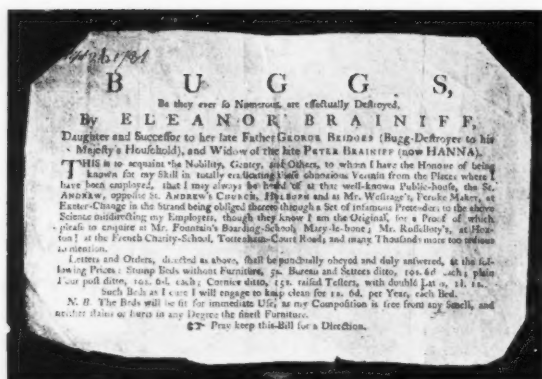
been known to Dalmatians, but were kept secret until about 1850.

After the date of the original discovery the most important year in the history of pyrethrum as an insect-control is 1924. Then two Swiss chemists, Staudinger and Ruzicka, elucidated the chemical composition of the plant's active principle, and showed its toxicity was due to two esters, which they termed "pyrethrin I" and "pyrethrin II"—a demonstration making the establishment of a quality standard possible for the first time. Their work started a great amount of independent investigation and such chemists, biologists and agricultural experts as Gnadinger and Corl in America; Tatu in France; Tattersfield of Rothamsted; Fryer and Gimmingham of Harpenden; the technical staff of the Stafford Allen farms at Long Melford, and others connected with private enterprises, have provided authoritative data for the growing of pyrethrum and preparation and use of its extracted pyrethrins.

The Lethal Principle.

With knowledge of its lethal principle, the obvious sequence was to locate its chief site in the plant; to find out the effects of soil, seasonal change, and harvesting and drying methods on the production of plants and powder with high-pyrethrin-content; and finally to determine at which development-phase of the flower toxicity reaches its maximum. Although some important points are still unsettled, these investigators have provided growers with a technique and information that makes successful raising of this crop on a commercial scale a mere matter of common sense. (In passing, it should be said that, although the difference between pyrethrin I and II is of chemical and biological importance, their action is sufficiently similar for it to be disregarded in practical work.)

Research soon proved that 90 per cent. of the pyrethrins developed in the achenes, or immature seeds, although these represent only about 35 per cent. of the flower-head bulk; that pyrethrum is very adaptable to varied soils, those with chalk giving least favourable results—Wye (chalk with patches of light loam) and Swanley (light loam on chalk) with seed of Swiss and Japanese origin respectively—although the worst test response was on East Malling's light loam over green-sand with Japanese seed. Considered together, these initial trials showed that in most agricultural districts



A "Bugg-Destroyer's" advertisement of the eighteenth century.

of England south of a line Yarmouth-Hereford-Barnstaple, pyrethrum of good quality could be grown; while experience has discredited the verdict of the Wye and Swanley tests.

Traditional practice and laboratory proofs are at variance about harvesting and drying. Despite irrefutable evidence to the contrary, the conviction that half-opened flowers and buds provide the most lethal powder persists from "rule-of-thumb" days and frequently the higher price is asked for this class.

But although now a drawback, this belief will have had value in pre-scientific production times. We now know that synthesis of pyrethrins in the immature seeds ceases when the flowers are fertilised, although the maturing seeds grow in weight. Therefore up to the point where petals start to turn yellow and fade, maximum toxicity remains in the heads although pyrethrin-content percentage to weight decreases. But very little time elapses before the fertilised seeds loosen, becoming easily shaken free by handling—a loss that greatly reduces the effectiveness of the resulting powder. The traditional harvesting of half-opened flowers probably results from uninformed observation of greater effectiveness in powder from them and attribution to development-stage, instead of to this wastage at their more potent phase.

Coming to modern practice, the locating of the pyrethrins as the essential toxic principle not only made a more deadly insecticide producible, but shifted the unit of valuation from mere weight to percentage of toxic quality. Its almost immediate effect has been to stimulate pyrethrum growing in countries where plant pests make it valuable as a control. Australia has had its commercial possibilities officially tested, and it was reported in 1933 that, even allowing for high labour costs, its growing left ample margin for profit. (In 1932

Australia imported 978 cwt. of pyrethrum valued at £4,632.) In Kenya, where it is effective against capsids and antestia bugs, which are harmful to coffee plants, about 200 settlers are raising pyrethrum, some on a large scale. It is claimed that the pyrethrin-content of Kenya-grown flowers is three times that of flowers grown elsewhere—an unsupported, and probably an optimistic claim; although it may have been founded upon comparison with early post-war Japanese and (especially) Dalmatian produce, of which the quality was poor.

In fact, discovery of the unsatisfactory pyrethrin-content in their imported stocks started both France and Switzerland experimenting with commercial growing of pyrethrum soon after its availability for outdoor use became a fact. But as English-grown flowers show a very high percentage of toxicity, the Kenya growers are probably right in claiming quality. A Kenya Growers' Association was formed last year, and the Agricultural Department of the Government is providing tested seed. The aim appears to be to set up an export trade, but some two or three years will pass before the home demand of about 100,000 lbs. annually can be satisfied.

An even more important indication of faith in the future of this crop comes from its original source, Yugoslavia. There, official plans are being propounded which, if they materialise, will do away with the traditional classifications of "closed," "half-open" and "open," substituting a single grade for export which will carry a Government certificate of a standard minimum pyrethrin-content. Such a policy, now being prepared for by keen analysis of various districts' qualitative and quantitative production, and drying and packing methods' results on effective keeping qualities, would bring that country back into something



Ready for harvesting.

like its old importance; unless and until user countries become self-supplying.

A summary of salient points affecting good pyrethrum production will help to show its value, as well as its peculiar problems. It is a dog-daisy-like flower, which grows about 3 feet high and, in established beds, becomes an intertangled mass of plants, being harvested by hand-picking in July. This hand-picking is necessary, but constitutes a big charge for labour. It is increased by two essential conditions—flowers must not be picked except when quite dry, without rain or dew traces, and they must be picked as rapidly as possible once the disc florets are nearly all open; otherwise there is danger of dislodgement of the fertilised, loosening seeds in which the bulk of pyrethrins is found. Hence maximum labour to harvest in minimum time in favourable conditions is imperative.

The pyrethrins deteriorate in toxicity from exposure to heat, sunlight, ultra-violet light, and from natural



Pyrethrum-pickers at work.

ageing or bad packing or storage. Therefore wind or air drying in sheds is preferable to sun-heat, while marketing and pre-using periods should be shortened as much as possible, a marked decomposition of pyrethrins occurring in flowers which are stored even for one year.

Results of cultivation on a Long Melford farm may give useful guidance. These are collated from experience covering the years 1930-33, four harvests included, which shows that seed should be set in March under glass and planted out in late June or July—too early planting leading to first-year flowering, which is useless commercially and detracts from plant development. The optimum distance apart for planting out in field beds proved to be 30 inches and 24 inches between



The picked flowers start for the drying shed.

plants; ridging is useful for drainage, pyrethrum being resentful of excessive moisture, although an exceedingly hardy plant. Crops in England will bear well for five years and possibly more. As regards the picking and yield, in hand-picking a good picker will gather 8-10 lbs. an hour of flower heads, but increases to 10-12 lbs. an hour if cutting with a stalk (7 to 10 inches). Other factors of interest are that the average price per cwt. was 60/- in 1930; 75/- to 80/- in 1932, and 100/- in 1933 (July); and that weight-yield varies greatly, both seasonally and according to the proportions of flower and stalk. The stalk has no commercial value but from 5 to 6 cwt. of flowers may be obtained to the acre.

As an insecticide, pyrethrum has signal advantages over many current controls. It is innocuous to man and is easily applied, both in powdered form and as an aqueous emulsion for spraying.

The lethal efficiency of pyrethrum is measured not only on chemical analyses of pyrethrin content, but on the results of biological tests also. To test an unknown pyrethrin content, a number of flies are transferred to a lethal box and sprayed by a set quantity of pyrethrin-impregnated spray, all conditions being those of a standardised constant. The effect is to bring the flies into rapid motion immediately, but all are down on the box floor within two or three minutes, spinning round but unable to fly, and finally dying.

It is to be hoped that English south-country growers will consider the question of growing this valuable addition to our commercial flora, especially in the light of the three advantages it offers—rising demand, rising price, and the proved fact that ordinarily well-grown English pyrethrum contains a higher percentage of pyrethrins than is usually found in imported samples.

Wax Effigies of Westminster Abbey.

By Lawrence E. Tanner, M.V.O., F.S.A.

Keeper of the Muniments, Westminster Abbey.

Careful cleaning has revealed the skilled workmanship of the Westminster "Waxworks," and Mr. Tanner demonstrates that their interest is no less artistic than historical.

Most people are vaguely aware of that strange collection—the "Waxworks," as they are familiarly called—which may be found in Westminster Abbey. Many people who have seen them "years ago when they were very young" would be puzzled to explain how they have come to be preserved at the Abbey. The real explanation is an interesting one. The effigies which have been preserved are the survivors of a custom whereby a life-size representation of a dead Sovereign or other great person dressed in clothes befitting their rank was carried at a State funeral. The last relic of the custom is to be found in the crown or the cocked hat and sword placed on the coffin at a royal or a naval or military funeral.

The custom goes back to very early times. The Abbey possesses a few of these mediæval figures. They are made of wood and they may be seen in the Abbey Museum in the Norman Undercroft. The earliest is traditionally supposed to represent Edward III. It is carved out of a solid piece of wood, and although the workmanship is rather rough it is evidently intended as a portrait. There is also a fine figure of Henry VII with a beautifully modelled plaster head. It was probably made by Torrigiani, whose noble tombs of Henry VII and of the Lady Margaret Beaufort are among the most beautiful in the Abbey.

These effigies were placed upon a temporary hearse set up before the High Altar, where, surrounded by

"the boast of heraldry and pomp of power," they remained for a month or so after the funeral. The later effigies were placed in wooden cases with glass fronts, and stood near the tombs of those whom they represented. About a hundred years ago these figures were collected and placed in the upper part of Abbot Islip's Chantry Chapel, and have remained there ever since.

There are eleven of these "Waxworks." They represent Queen Elizabeth; Charles II; the Duchess of Richmond (d. 1702); King William; and Queen Mary; Queen Anne; the Duchess of Buckingham (d. 1743) and her two sons, one a child, the Marquess of Normanby (d. 1715), and the other, Edmund Sheffield, Duke of Buckingham (d. 1735); William Pitt, Earl of Chatham; and Nelson.

Recently these figures have attracted a certain amount of public attention, for the Dean and Chapter decided to consult the authorities of the Victoria and Albert Museum

to see how far it would be possible to remove the dust and dirt which, in spite of more or less dust-proof cases, had gradually gathered upon these effigies. As a result, six figures have now been cleaned, and a detailed examination has proved so satisfactory that it has been decided gradually to submit the whole collection to the same expert hands.

The figures which have been cleaned are those of Charles II; the Duchess of Buckingham and her small son; the Duchess of Richmond; Queen Elizabeth; and



The effigies of the royal lovers, Charles II and "La Belle Stuart," are clad in robes of the period. The lady was the model for the "Britannia" that still figures on our coinage.

Queen Anne. Of these, Charles II is by far the most interesting. It is unfortunate that the bill for making the figure does not seem to have survived, although the bill for the contemporary oak case is in existence. The head was modelled in wax by a master hand. It is unquestionably one of the most interesting and lifelike portraits of the King which exists. The dark and deeply lined "fierce countenance," as Evelyn called it, with the prominent "Hapsburg lip," is most remarkable. He is dressed in genuine Garter robes, probably the earliest which exist in England, and he wears the great plumed hat with its tuft of black and white herons' feathers of that "most noble" Order. Next in interest is perhaps the figure of the Duchess of Richmond, "La Belle Stuart," with whom Charles II was more nearly in love than with anyone else. Some of her charm still lingers in the wax face, and the "little Roman nose" which so fascinated Mr. Pepys and kept him awake at night is a prominent feature. She is dressed—as she desired in her will—in the robes which she wore at the Coronation of Queen Anne, and she has the "fontange" or elaborate headdress interlaced with gold braid and paste jewellery which was fashionable at the time. On a stand by her side is perched her favourite parrot, which survived her only a few days. It is probably the oldest stuffed bird in England.

The Duchess of Buckingham and her small son are also dressed in the clothes which belonged to them. The child has a most elaborate cerise-coloured velvet coat with silver braid froggings. At the back of the shoulders were two slits which were no doubt intended for the leading-strings which guided his infant footsteps.

The Duchess was a natural daughter of King James II and insisted on being treated as a royal Princess. Even when she was dying she made her ladies promise that if she lay senseless they would not sit down in her

presence. When Lady Huntingdon endeavoured to interest her in the early Methodists she replied that in her opinion their doctrines were "most repulsive and strongly tinged with impertinence and disrespect

towards their superiors." She added "It is monstrous to be told that you have a heart as sinful as the common wretches that crawl the earth." Horace Walpole said that she was "more mad with pride than any mercer's wife in Bedlam," and something of this appears in the face of the effigy. There is no doubt that the figure was made and dressed under the Duchess's personal supervision. The clothes are of the most elaborate description. With her Peeress's robes she wears a magnificent brocaded skirt and her sleeve ruffles are

of the finest Burano point lace. Her rose-red satin petticoat and other undergarments are all of the finest workmanship, and on her feet she wears a pair of exceptionally high-heeled green satin shoes with gilt braiding and buckles set with paste. It was curious to find that the black velvet on which her jewellery was sewn had been stiffened with bits of old playing cards. These have now been framed and placed in the case by her side.

The figures of Queen Elizabeth, Queen Anne, and King William and Queen Mary are of less interest. Queen Elizabeth was entirely remade in 1760, and no trace of the original figure now remains. The face, however, which was perhaps a copy of the original one, is not without interest, and the strong popular appeal which this figure has always excited has been heightened since its recent cleaning. The three other figures are contemporary portraits, although they were not carried at the funerals. They were probably made "to the life" by the "celebrated waxwork woman" Mrs. Goldsmith. William III is placed upon a footstool, yet even so fails to equal the height of his Consort.



Queen Elizabeth and the Duchess of Buckingham. The Duchess's garments are of the most elaborate workmanship, notably the Venetian lace ruffles of the sleeves.

The remaining two figures, Chatham and Nelson, were frankly bought to add to the interest of the collection. At that time the fees charged for seeing the waxworks were divided among the choirmen, and it was obviously to their interest to see that the collection was kept up to date. The figures are, however, of considerable interest. The figure of Chatham was modelled by Mrs. Patience Wright, an American lady, who came to England during the War of American Independence. She was an artist of very considerable merit, and many distinguished people are known to have sat to her, although this full-length figure appears to be the only one which has survived. She is now known, however, to have been a spy, and she made good use of her opportunities to extract useful information from her sitters. The figure of Chatham is dressed in his parliamentary robes and is quite uncannily alive. It has yet to be cleaned. There is one other curious point in connection with this figure. When it was placed in the Abbey in 1779 it was put in one of the older cases in the Islip Chantry. It was noticed that the roof of this case appeared at one time to have been painted, and as this interfered with the colour scheme it was promptly "blacked out." Sixty years later the then Abbey architect, Mr. Blore, had this roof (which stretched also over two other cases) removed and found that it was a thirteenth century painting of supreme craftsmanship. It was, in fact, the original painting over the High Altar (the Retable) dating from the dedication of the Abbey Church in 1269. It is now framed and stands in the Ambulatory. It is a supremely beautiful thing and one of the greatest treasures that the Abbey possesses.

Lady Hamilton's Touch.

The figure of Nelson was remodelled by Catherine Andras, probably from life. With the exception of the coat, it is clothed in clothes which actually belonged to him. Like the Chatham effigy, it is remarkably lifelike, and it was generally acclaimed at the time as an admirable likeness. It is related that a few days after it was placed in the Abbey in the spring of 1806 it was seen by Lady Hamilton. After looking at it she said that the likeness "would be perfect, if a certain lock of hair was disposed in the way he always wore it," and she asked to be allowed to arrange it with her own hands. Unfortunately the cocked hat has at some time since been so placed that it hides the hair. Recently, however, an opportunity arose to remove the hat, and it was found that, although displaced, it was still possible to see that the hair had been pulled forward in a way that suggested the hand of Lady Hamilton.

Provision against Drought.

Bouverie House, the home of *Discovery*, has had an independent water-supply ever since its construction in 1926. The original artesian well, which extends down 450 feet into the chalk underlying the London clay and the greensand, has been working at full pressure continuously, and its supply pipes are beginning to show



Drought precautions at Bouverie House, Fleet Street, the home of "Discovery." An artesian well being bored.

the effects of water corrosion. A new well is accordingly being bored, this time to a depth of 700 feet, which will act as a relief to the original well. It is customary to bore artesian wells on a site before any buildings are erected, and our illustration gives an idea of the awkwardness of the present operation. In addition to the usual difficulties caused by the flooding of the hollow drill by water-pockets in the overlying clay, the lack of overhead space makes the insertion and extraction of the long clearing-rods a very tedious and difficult process.

A New World-Cruiser.

In January, 1935, the *Empress of Britain*, the largest vessel ever to encircle the globe, will leave Monaco on a grand cruise round the world. The itinerary, including many places off the beaten track, provides for visits to the various countries at the best time of year for each. The wonders of the *Empress of Britain* and the places of historic interest and scenic beauty to be encountered on the cruise are described in a brochure, a copy of which may be obtained on application to the Cruise Department, Canadian Pacific, 62, Charing Cross London, S.W.1. It is pleasing to note that this attractive brochure was produced by British printers.

The Life of the Eel.

ALMOST simultaneously with the appearance in our August number of Mr. Hornell's interesting article on the Comacchio eel-farms, the *Revue des Deux Mondes* of July 15th publishes a notable memoir, by M. Louis Joubin, on Dr. Johannes Schmidt, the eminent Danish scientist, who died last year. Dr. Schmidt's greatest achievement was the discovery of the life-history of the common eel, which occupied eighteen years of research.

The life-history of the eel, the mystery of which already attracted the attention of scientists in the days of Aristotle, remained an unsolved enigma until 1897. In that year the Italian observers, Grassi and Calandruccio, discovered in the Straits of Messina large numbers of a small transparent lanceolate creature which they christened *Leptocephalus*; on investigation this was recognised to be a larval eel, and its discoverers hastily concluded that it was hatched in the deep waters of the Straits. This theory did not explain the presence of mature eels in non-Mediterranean waters, and it was exploded by Schmidt's discovery in 1904 of a solitary *Leptocephalus* off the Faroes. The full-grown *Leptocephalus* is about five-sixteenths of an inch in length, and would be imperceptible in water but for its tiny black eye-spots. It is capable of only the feeblest independent movement; wherefore Dr. Schmidt concluded that it must be current-borne, and directed his search south-westward across the Atlantic. After eighteen years of minute examination he was successful in demonstrating that the infant eel is hatched between Bermuda and the Sargasso Sea, at a depth of from 500 to 600 fathoms, 4,000 miles from the European coast.

The new-born *Leptocephali* are only four millimetres long, and, being lighter than water owing to a small drop of oil which they carry, they rise to the surface and drift, gradually growing, across the ocean, occupying two years in the passage. On reaching shoal water they transform themselves into small pink elvers, which are extensively netted for food on the Biscay coast. In another year they grow to become small eels, the males remaining near the coast, the females ascending the rivers. At the end of the sixth year the descent to the sea begins, and in six or eight months the adult eels recross the Atlantic to the spawning-grounds, breed, and die. At all events no eel that has hatched a brood has so far been discovered. The American eel (*Anguilla rostrata*) has its breeding-ground in the depths a little farther west; owing to the relatively short distance from the coast, the larva has only a year's oceanic journey.

Basing his arguments on the distinctive distribution of eels—there are none in the rivers of the South Atlantic

nor on the Pacific coast of America—Dr. Schmidt postulated the necessity for breeding-waters which fulfilled the conditions of great depth, high surface-temperature, and high salinity. His later researches fully bore out this theory. In his circumnavigation in the good ship *Dana II* (360 tons) he distinguished various species of eel, but always in the vicinity of suitable pelagic depths. The most conclusive proof was afforded in the rivers of Sumatra. Those on the north-east side, entered from the shallow Sunda Sea, are eelless; but on the south-west side, between Sumatra and the Mentawai Islands, is a deep-water trench providing the exact conditions necessary for the breeding of eels, and the rivers are full of them.

This remarkable voyage, the hardships of which most likely shortened Dr. Schmidt's life, was financed partly by the Danish Government, partly by the Carlsberg Foundation, a trust by which the entire profits of a great Copenhagen brewery are distributed between Science, Art, and Charity. In some sort by way of a return, Dr. Schmidt directed his researches also towards the improvement of the breed of hops greatly to the advantage of the brewing industry.

Attractive Postal Propaganda.

Our own General Post Office is not behindhand either in enterprise or in the circulation of propaganda—the issue last month of a new series of postage stamps differing slightly in colour and method of printing is a proof that this government department has not gone to sleep. The Swiss Post Office, meanwhile, has struck out along a new line in the way of advertisement. The ancient terrors of the Alpine passes led travellers to seek the supernatural protection of the saints; few indeed are the important mountain roads that have not some sanctuary, small or great, at their summit. To-day, thanks to the efficiency and safety of the Postal Motor Coaches in Switzerland, we are perhaps apt to forget the holy men who gave courage to wayfarers, if they gave nothing more; and by way of reminding us of the long history of the trans-Alpine routes the General Post Office at Berne has produced an attractive portfolio of coloured woodcuts, by the Bernese artist Paul Boesch, representing the guardian saints of the principal passes: St. James of Compostela, St. Gotthard, St. Bernard of Menthon, St. Bernardine of Siena, St. Maurice, and the Blessed Nicolas von der Flüe. Of these only the last, a 15th century hermit (Bruder Klaus), was a Swiss, but St. Bernard was mountain-born, from just over the frontier in Savoy. On the cover, St. Christopher presides over motor-coach and mountain railway, as he does on the dashboard of our sceptics' motor cars.

The World of Children's Dreams.

By C. W. Kimmins, M.A., D.Sc.

While there has been a tendency to confine the investigation of dreams to those of the abnormal only, Dr. Kimmins points out that the dreams of healthy children are as important as those of the less fortunate. The interesting claim is made that dream-research may prove of high value in solving many problems of early child life.

FROM the very dawn of history the world of dreams has occupied a position of unique interest. In the Biblical record the interpreter of dreams was regarded as a man of exceptional power and ability who could penetrate the mystery of the occult and give to the world the meaning of the night-vision. Among primitive races the dream is regarded with reverence and anxiety as the message from the back of beyond of something of immense importance to the welfare of the dreamer. Hence the extraordinary influence of those who profess to be able to unravel the symbolism of the mysterious visitation and translate it into the language of everyday life.

The universality of the dream is in itself evidence of its biological significance but in the past the scientific study of the dream has received insufficient attention.

The experiences of the Great War, however, brought into special prominence the position of the dream and established its importance as a most valuable instrument in the successful diagnosis of certain forms of mental disability caused by the stress and strain and the abnormal conditions imposed by the severe struggle of long-continued warfare. The special hospitals for shell-shock and similar causes of mental disturbance were largely under the control of distinguished psychologists who could use to great advantage the evidence afforded by the dreams of their patients. In many cases such investigation pointed clearly to a distant source of trouble in early childhood by repression of painful experiences, the discovery and release of which resulted in the solution of the difficulty and the ultimate complete recovery of the sufferer.

The Nature of the Dream.

Naturally, with the great advance of the dream in its employment in the investigation of neurotic cases, and the improvement of the technique in psycho-analysis there has been a concentration of attention on the dream in its relation to the flotsam and jetsam of the mental hospital and the consulting room. It is, however, remarkable that so little consideration has been given to the dreams of normal, healthy children. Freud in the *Traumdeutung* gives approximately two per cent. of his space to them.

According to Freud, what is known as the unconscious

consists almost entirely of material which has been repressed because it is painful and repulsive to consciousness. This suppressed material may eventually become so dissociated from the normal content of consciousness that the ordinary laws of association have not the power of recalling it, as in the case of ordinary facts and experiences which are not repulsive to consciousness. To prevent the passage of the contents of the unconscious into the state of consciousness, there is a well-ordered mental adjustment, which Freud personifies under the name of the censor.

The "Censor's" Action.

In the sleeping condition, however, the censor is less alert than in the normal waking state, and in dreams, material in a disguised form, a sort of camouflage, which makes it appear unoffensive, enables some of it to get through from unconsciousness to consciousness. The expert knowledge of the investigator enables him, by removing the camouflage, to lay bare the true material as it exists in the unconscious, and herein lies the skill of the interpreter of dreams. A dream which appears to the layman simply an absurd jumble of irrelevant material may now become something which is full of meaning.

Freud admits that children's dreams generally contain no problem to be solved. There is no necessary division into latent and manifest content. The oft-quoted Simony Hut dream in which a child dreamed, after seeing the Hut through a telescope, that the arduous climb was over and that the Hut had been reached, is typical. He (Freud) expresses a strong doubt whether an unfulfilled wish from the day before—as in children's dreams—would suffice to create a dream in an adult. Similarly the effect of reading a book the day before in producing a dream, also quoted by Freud, would rarely have any influence on an adult's dream:

"A boy of eight dreamt that he was being driven with Achilles in a war chariot guided by Diomedes. The day before he was assiduously reading about great heroes."

In the writer's collection of dreams, a crippled boy of nine, who had evidently been reading about St. George and the Dragon, gives this account of a vivid dream:

"Last night I dreamt that I was a brave knight. A great big monster came running after the most beauti-

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ful lady I ever saw. I drew my sword and hit the monster on his back. He roared so loud that the lady screamed. I said, 'I will soon slay this monster,' and I hit him again and then I cut off its head, and he fell dead on the ground. The lady said 'You are a hero.' Then I awoke."

Bergson, who lays great stress on the presentative nature of the origin of dreams, points out that in the dream we can analyse sense impressions received from the outside world and use those elements necessary to satisfy the mood of the dreamer and the idea that fills his imagination at the time. Thus "a gust of wind blowing down the chimney becomes the howl of a wild beast or a tuneful melody."

The sense of time and also that of distance are obliterated; the dreamer suddenly finds himself in a different part of the world and as suddenly finds himself at home. All this adds to the wonder and charm of the dream for the child. Normal, healthy children are very rarely seen to laugh in their dreams, though they frequently smile, probably as the result of the pleasure derived from wish-fulfilment rather than the appreciation of any humorous element, which is recognised as humorous, in the dream state. Any evidence to the contrary is probably due to a confusion of the hypnagogic—or half-waking—state with that of true sleep.

The nature of the dream is well summarised by Watt in the chapter on "Reflection" in *The Common Sense of Dreams*:

"The dreaming mind, we may suppose, is working on an averagely lower level and within a narrower field. Its power of abstraction is weakened and it does not make the effort of reflection required to bring its operations into connection with their intellectual causes or occasions and so to survey their adequacy as solutions methodically and logically. In other words, dreams are reveries, not acts of hard thinking."

Dream Interpretation.

In the adult's dream, although something that occurred the day before forms the starting point, the material of the dream generally has no reference whatever to recent events and may be heavily symbolised. One of the great compensations of the adult's dream is that the memory of his worries and troubles rarely enters dreamland. The exhausted emotions of the day find rest in sleep at night. During the London air raids the writer was keeping a careful record of his dreams but in only one case did any raid form the subject of a dream and that was not of an unpleasant but rather of an amusing nature.

The competent observer appears to have little difficulty in obtaining satisfactory interpretations of his

dreams without the aid of recognised experts. This is made possible by proceeding on the lines adopted by Rivers of attacking the problem *immediately after the dream* before any fusion of waking with dream material takes place. If the record of a dream made on waking is compared with that of the memory of the same dream, say ten hours afterwards, considerable differences in the records will be found. Interesting accounts of their own dream solutions are given by Havelock Ellis (*The World of Dreams*), R. F. Fortune (*The Mind in Sleep*), R. Graves (*The Meaning of Dreams*) and by many other writers.

In connection with the nature of the dream, Professor Piaget and his colleagues at the University of Geneva have investigated the very interesting question of the child's own conception of the dream, the importance of which it would not be possible to overestimate.

Many experiments have, from time to time, been carried out by experienced observers in attempts to affect the nature of the dream by means of applying stimuli, such as varying light and sounds and those associated with the presentation of olfactory and tactual material, in the immediate neighbourhood of the dreamer. A certain measure of success has been achieved in various directions but the results have not been sufficiently definite and suitable for general application and for the adoption of any particular line of action.

Arnold-Forster, however, in her *Studies in Dreams* gives an interesting account of her own limited and partially successful experiments in dream-control, first in eliminating a certain class of dreams (bad dreams, whether of grief, evil or fear), and, secondly, in the cultivation of the particular type of dream which she found to be most pleasurable. The formula, which she used very effectively, was "Remember this is a dream. You are to dream no longer." In this way she succeeded in switching off any unpleasant dream.

The distinction between the night-dream and the day-dream is simply one of degree. In the day-dream there is also a withdrawal of the attention, more or less complete, from external sources, and there is also a greater or less degree of mental automatism.

The Day-Dream.

The lonely or neglected child or one who suffers from a fully developed inferiority complex may find great solace in the day-dream and become increasingly out of touch with the healthy mental and physical activities of childhood. In many cases of ultimate imbecility the origin of the mental weakness may be traced to excessive day-dreaming.

There is no question as to the great pleasure to be derived from the reveries of day-dreaming. They

afford great relaxation to the mind; but there is a danger that the servant may become the master, and mental imagery may control the mind. Day-dreaming is often associated with high intellectual endowment and creative ability. Robert Louis Stevenson in his "Chapter on Dreams" in the book of essays, *Across the Plains*, fully acknowledges the enormous advantage he derived from night and day-dreaming, as in *The Strange Case of Dr. Jekyll and Mr. Hyde*. A long list might be given of great artists, novelists, and scientific discoverers who have contributed similar acknowledgments. Herbert Spencer was a great day-dreamer.

The Fairy Story and the Dream.

In spite of fear dreams children in normal health delight in dreaming and it is an evident pleasure to them to talk about or record their dreams. For the young child the basis of the extraordinary fascination of the dream is unquestionably the fairy element, for a very close connection exists between the fairy story and the dream. The return to fairyland at night must be a real source of joy to the child long after he has been forced into a partial, and somewhat grudging, acceptance of the verdict of the outer world with regard to fairies. It is of the greatest interest to trace, in all stages of development, the struggle for the retention of as much as possible of the delightful fairyland existence. It is seen in the attitude to the toys of the nursery, then in the invisible friend or other childish phantasies, and later in the impossible demand for abnormal fairy qualities in animals. In all these struggles, with a continual weakening of the fairy position, there remains the compensatory nature of the dream with occasional visits to fairyland.

The Compensatory Value of the Dream.

There is no type of school in which the compensatory function of the dream is so clearly marked as in the industrial and reformatory schools. The children have practically all had terrible experiences of wrecked homes and dissolute parents. Many of them have also had extensive thieving experiences which resulted in their commitment by the magistrates to these institutions. The dreams of children in these schools are of special interest, and in some respects they have marked characteristics which separate them clearly from those of normal, elementary-school children. The dreams are frequent and vivid. The age range is ten to sixteen years. There is nothing to indicate harsh treatment at the schools, and the fact that many of the teachers play a friendly part in the dreams, coming to the rescue in perilous times, and in many other ways, shows that the children are on good terms with those in authority.

The comparative monotony of institutional life, however, finds undoubted solace in the dreams of fulfilled wishes and those of bravery and adventure.

In dream literature, insufficient attention is given to the extraordinary compensatory value of the dream. It can be shown in many records of children's dreams that, under its influence, the deaf can hear, the blind see and sorely handicapped crippled children can perform feats of great physical endurance. Moreover, as can be seen in the records of the dreams of children in industrial schools, those who had missed all the care and affection surrounding the happy child in a well-ordered home were transferred in dreamland to ideal surroundings where every wish was gratified.

Educational Value of the Dream.

The normal child thoroughly enjoys school life, but not infrequently cases are found in which the child, for no obvious reason, is absolutely out of harmony with his surroundings. He is not lacking in ability, is apparently healthy, and has definite out-of-school interests, but his life in school is one of continual opposition to authority. The dreams of this type of difficult child would be of special interest and might be of the greatest value, not only in indicating some particular line of possible development, but also in throwing light upon any special feature wanting in his environment. A special study of children's fears at different ages would also be of considerable value, but for this purpose dreams should be recorded at regular intervals. Thus, in a variety of ways in normal school life, much useful information may be obtained by a study of children's dreams which cannot be secured so well by any other method.

As a result of an investigation of dreams carried out with unusual thoroughness and care, De Sanctis came to the conclusion that dream life is a revelation of individual character. This is especially the case with young children. The dream lets in a flood of light as to the temperament and mental make-up of the child; it may also indicate the presence of repressed material in the unconscious.

It is claimed that with the assistance of the experts associated with school clinics the scientific investigation of children's dreams may become a very valuable element in educational procedure. There is ample evidence that there is in the dream of the child an excellent field for patient research. There are many problems in early child life which are in urgent need of solution and in this important work a careful study of children's dreams may play a very useful part and prevent the ever-present danger of adopting methods of instruction which may result in the baneful effects of repression.

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The Story of the Duck Decoy.

By G. H. March-Phillipps.

Decoy ponds, in their present form, are an invention of the 18th century, though this method of fowling has a much longer history. The elaborate precautions necessary to trap the wary duck demand great skill and patience on the part of the decoymen; and it will be regrettable if this ancient country craft is allowed to perish.

THE practice of taking duck in a trap or pipe goes back many hundreds of years. The exact date of the earliest English decoy is difficult to ascertain, but we read of their existence as long ago as the early 17th century. In Coward and Oldham's *Birds of Cheshire* it is stated that Sir William Brereton, the Parliamentary general, had a decoy working in Cheshire in 1634, and that he paid a visit in the same year to a Dutchman, Gabriel Direckson of Delft, who had one very similar to his own. Writing of this visit the General uses the word "coy" instead of decoy. Both these words are probably abbreviations of the Dutch word *endeekooi*—a duck cage. The eastern counties, with their wide stretches of marsh and fen, have always been a favourite haunt of duck, and therefore the home of decoys. Norfolk claims to have had the earliest of these, a decoy built by Sir William Woodhouse in the reign of James I. Yorkshire, another great county for duck, had a decoy somewhere near Doncaster about 1650, and there is said to have been a decoy at Houghton in Nottinghamshire in 1665.

As far as is known the early English decoys were very primitive affairs. In those days the wild-fowler had not learnt the trick of curving the pipes, and so had to trust to frightening the duck into the net bag, or some such contraption, which could be seen from the decoy pond. A sketch of one of these primitive affairs is given in Willughby's *Ornithology* of 1678, and consists merely of a circle representing the pond with three perfectly straight pipes leading out of it. It is difficult to say when the curved pipe was first introduced, but there was very little attempt at scientific construction until the time of George Skelton. Skelton was born at Friskney in Lincolnshire about 1760. He spent his life as a decoyman, and was responsible for introducing the small

decoy pond, a revolution in design, as most decoys were then situated on open pieces of water of fifty or more acres in extent. Much to the amusement of the experts of those days George Skelton started designing decoy ponds of two, three, and four acres, and proved that duck would come to ponds of this size just as easily as they would to the large ones. They possessed great advantages. On very large ponds it was quite possible for hundreds of duck to alight without getting within decoying distance of a pipe. Whereas on ponds of only a few acres every duck was within easy distance, and would inevitably feed only a few yards away from one pipe or another. In the year 1819 George Skelton took 2,400 duck in seven days off a pond of his own design.

Old George Skelton had four sons, George, William, Richard, and Henry, and one grandson, Thomas Gilbert Skelton, all of whom acted as decoymen and designers of decoy ponds. To this family belongs the credit of revolutionising and perfecting the English decoy. One or other of them had a hand in designing or altering almost every known decoy, and the

two or three acre pond became universal. Thomas Gilbert Skelton, perhaps the last designer of decoys, died in Wells Union in 1918 at the age of 94.

A very fine example of the art of this family can be seen on Lord Ilchester's estate at Abbotsbury. The age of this decoy is unknown. It was probably used to supply the Abbey of St. Peter, whose ruins and tithe barn can still be seen above the Fleet estuary; and the decoy, like the adjoining swannery, may possibly date back almost to the time of King Canute. But whatever its age it has been brought thoroughly up to date, and is now an excellent example of the small decoy pond. It is



Ready for the decoyman. A typical reed-edged haunt of duck, with a "close-up" of a pintail in full plumage.

said to have been planned by Thomas Gilbert Skelton. In the centre of the system is the decoy pond, a shallow pond only one and a quarter acres in extent, sheltered on all sides by a dense growth



The decoy pipe has a cunning curve, and the reed screens afford good cover for the decoymen.

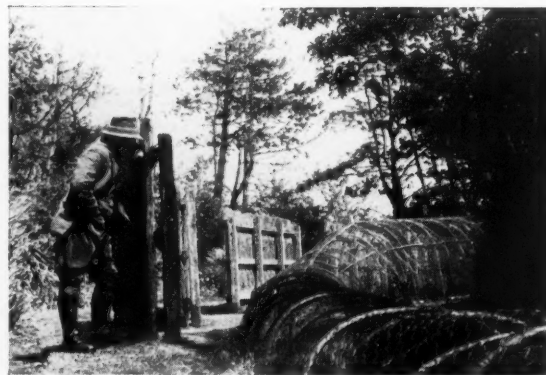
of reeds and pampas grass, and screened from the hills to landward by a high belt of trees. This pond is an ideal one for attracting duck. The pampas grass and reeds form a shelter which, while not giving the duck the impression of being hemmed in, affords them absolute seclusion. In fact it is not possible to see the pond except from the mouths of one of the pipes. It is shallow and has a bottom well covered with weed to attract surface feeders.

Three pipes open into this pond, and a fourth into the backwater behind the Chesil Bank. Only two of these pipes are in working order now, but not very long ago all four were in use. The principle of having four or more pipes is to make allowance for every variation in wind. When working a pipe it is best to have the wind blowing straight from the duck to the decoymen. A pipe can be worked quite effectively with the wind at a certain angle across it, but should this wind vary to any extent there is always the danger that the duck may smell the decoymen and become suspicious. The four-pipe layout insures that one pipe can be worked with complete safety whatever quarter the wind is in.

The pipes are about fifty feet long, and are constructed out of ash and willow hoops, covered with wire netting. At the entrance they are nine feet high and twelve feet across, and they taper throughout their length to a height and breadth of two feet. Each pipe is slightly curved so that one end is invisible from the other, and down the centre flows a stream of water controlled by a sluice at the small end. It has been found that duck will come more readily into a running water decoy than

they will into a dead water one. Down one side a series of reed screens, five feet six inches high and ten feet long, is set slantwise to the run of the pipe. In each screen there is a small spy-hole, closed by a rush or chip of wood, from which a view of the decoy pond can be obtained. Owing to the slant of the screens it is possible for a man to walk the whole length of them without being seen by anything in the pipe or on the decoy pond.

The working of a decoy is most interesting to watch. From July 1st the decoy pond is kept absolutely quiet, for by then any duck hatched in the neighbourhood are beginning to come in, and will use the pond as a feeding ground, thus attracting others from further afield. Food is the chief attraction, and for this reason the pond is kept well stocked with weed, and grain is scattered over its surface when this begins to give out. It is not until October, or thereabouts, that any duck are taken, which allows three months for them to get used to the pond. At Abbotsbury two men are used to work the decoy, one to manage the net bag in which the duck are taken at the small end, and the other to drive them up the pipe. A quantity of grain is floated out into the channel, and a decoy duck, a wooden model painted true to life with glass eyes, is anchored in the mouth of the pipe. This decoy bird gives the duck confidence and they swim into the pipe to feed. Meanwhile the two decoymen are in position at a peephole in one of the rear screens. As soon as there is a sufficient number of duck in the pipe, one man goes to the net-bag end, and the other runs up behind the screens to the mouth of the pipe. Here he shows himself to the duck in the pipe by placing himself at a gap between two screens. The duck, seeing a man behind them and no one in front, owing to the curve of the pipe, do not try to escape back to the decoy pond, but swim on down the pipe to the net-bag end. The man follows them, waving them on



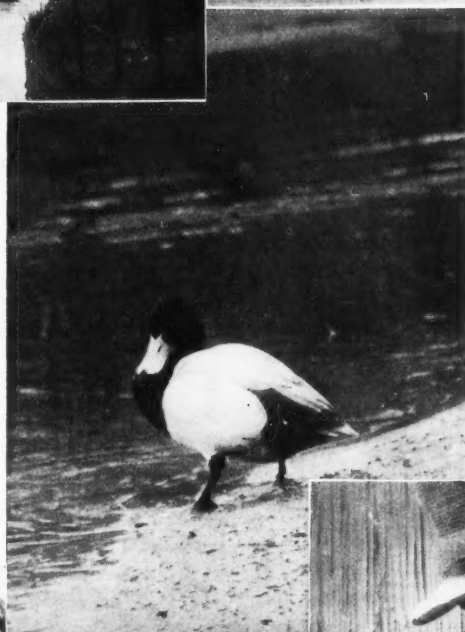
Here the taper of the pipe is clearly seen, and the way in which the decoyman is visible from one side only.

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(Above) The mouth of a decoy pipe and the channel from the pond. (Centre) The handsome scaup, which favours coastal waters. (Below) The slanting reed screens conceal the man except from the lower part of the pipe.



(Above) The decoy pond, with the entrance to the main pipe. (Below) Closing the spy-hole in the reed screen with a slip of wood.



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at intervals through gaps in the screens, until they are all safely in the net-bag. The net-bag, or tunnel-net as it is sometimes called, is built of circular hoops of willow about sixteen inches in diameter, covered with string netting. The duck in the bag protrude their necks through the netting in an effort to escape, and the decoyman breaks them quickly and painlessly with a single turn of his wrist. This operation is carried out in complete silence, so that any duck still feeding on the pond near the mouth of the pipe may continue feeding undisturbed. They have heard nothing. When the decoyman came to the mouth of the pipe he was hidden from the pond by the first screen, and only showed himself to the duck in the channel; the curve of the pipe prevented them from seeing what was going on at the net-bag end; they will therefore continue to use the decoy pond as their habitual feeding ground.

In some decoys a dog is trained to run down the pipe, showing himself at intervals between gaps in the screens. Instead of frightening the duck up the pipe, as a man would, he attracts them along the pipe, the inquisitive creatures stretching out their long necks to get a better view. So curious are the duck that cases have been known of them following a stoat or a kitten into a pipe.

Common wild duck, teal, and widgeon are the three species of duck regularly taken in decoys. They are

surface, or shallow water feeders, and will eat grain and bean stubble scattered over the surface of the pond. The deep water feeders, or divers, such as pochard and tufted duck, are taken very occasionally. They do not feed on grain of any sort, and if they venture into the pipe it is only out of curiosity. Once in the pipe they will make a determined effort to fly back to the pond when the man appears, and they are only captured if they are carried into the net-bag by sheer weight of numbers.

In the days of George Skelton enormous quantities of duck were taken in decoys, and large profits were made in spite of the low price they fetched at the time. Decoying then was a regular profession, and it was no unusual thing for a decoy to net £500 or £600 in a season over and above their working expenses. At that time there were as many as two hundred decoys in England. But now things have changed, and the number has dwindled to about twenty. No great number of duck is taken at Abbotsbury; the decoys are kept up largely as a matter of general interest, being adjacent to the swannery and open to the public, but fifteen different kinds have been seen on the decoy pond. These include rare duck such as pintail, golden-eye, scaup, smew, merganser, and goosander. As an example of an art which is fast dying out the Abbotsbury decoys are worth many visits.

New Steps in Chemical Knowledge.

The "Chemical Age" comments editorially on the unwisdom of dogmatism on the basic facts of science. The discovery of elements beyond the magic number 92 would have come as a shock to the chemists of not so long ago.

THE history of scientific discovery may be written in many ways, but the book for which we are waiting has not yet been written. It would show how certain, how absolutely positive is the scientific world at any given time of the correctness of its knowledge. Only a few individuals know that they know not. There are many examples from the realm of chemistry, one of which has just been brought to light.

Throughout the nineteenth century we *knew* that atoms were the bricks of the universe, whole and indivisible. Thus the attempts of the alchemist at transmutation were smiled upon as the childish attempts of a world not yet fully grown. In 1896, however, the discovery of radioactivity altered our conception, and in the years that have passed we have come to divide the atom, to transmute elements and to discover "isotopes" which could never have fitted into the nineteenth century frame. We further discovered that the universe was built up of two bricks only, the proton and the electron. Recently, however, we have discovered the neutron and the positron; there is some suspicion of yet a fifth brick, an uncharged particle of electronic

mass. To our minds the discovery of so many bricks suggests that each of these "bricks" will later be found to be composite—but that is reserved for the distant future. The mathematical theory based upon the proton and electron showed that there could not exist more than 92 elements; the fact of the existence of a limit of 92 was freely taught until last month. Signor Fermi has now described how by bombardment of elements with neutrons (uncharged particles of mass slightly greater than the proton) he has induced artificial radioactivity, and by bombardment of uranium, the heaviest element, he has produced a new element which cannot have the atomic numbers 86 to 92, which is almost certainly heavier than uranium, which may have the atomic number 94 or 95, but which probably has the number 93. The properties of the new element—if such it proves to be—resemble those of manganese and rhenium. Upon the heels of this announcement comes the statement that there has been discovered in pitchblende, a radioactive element heavier than uranium. This may be the identical element produced by Fermi, or it may be an isotope. Thus does science progress.

Two Englishwomen in Andorra.

By Lady Vyvyan.

The mountain republic has always attracted the enterprising traveller. Now that it is traversed by a practicable highway, will it lose its charm and individuality?

ANDORRA has, among European countries, no rival and no congener; it is unique. This small republic in the folds of the Eastern Pyrenees measures not more than 18 miles from east to west and 20 miles from north to south. Its independence has never been undermined by the annual tribute of 960 francs paid to France and 460 francs paid to Spain.

Legends account for the name of the country in diverse fashion. One has it that Louis le Débonnaire, son of Charlemagne, after defeating the Moors in this mountain fastness, cried: "Wild valleys of Hell, I christen you Endor!" Another ascribes to the word a Moorish origin, the Moorish word for forests being *aldarra*. The average height of the land is over 5,000 feet, and there are many summits over 9,000 feet. The people of Andorra, who do not exceed 6,000 in number, are tough and fond of money, independent, polite, resentful of any interference, proudly tenacious of their liberty; they live by tillage, pasturage and smuggling while rich ores remain in the mountains, for lack of fuel has throttled their mining industry. They utilise every ounce of soil, and often on a mountain-side may be seen a cultivated terrace only a few yards square enclosed by a stone wall. The pasturage on the slopes above Soldeu has long been famous, and many thousand Spanish sheep are driven up the stony trail in May and June to fatten on those heights until September. In the west there is less vegetation on the heights, and there the mountains, gaunt and lonely and forbidding, shelter bears and wolves, there the rocks are haunted by the eagle and the vulture.

Andorra has for a thousand years lived under the same form of government, and until to-day change and civilisation have been barred out from this

mountain country of a Catalan tribe. French will help you a little and Spanish will help you considerably as you travel through the country, but the Catalan language spoken by the people of Andorra is a thing apart, and always, after a word or two of French or Spanish, they relapse into their own tongue.

Tradition says that Louis le Débonnaire, in a charter dated A.D. 819 now resting in the archives at Seo de Urgel, confirmed the independent status of Andorra subject to a small annual fee payable to the Bishop of Urgel for military protection. Modern research has proved this charter a forgery, but this much seems to be credited by historians; that Charlemagne, after defeating the Moors, repopulated some of the lonely Pyrenean valleys by promising the people independence; that a series of free states were thus formed; that most of them were absorbed in course of time while Andorra retained her rights. In the thirteenth century the House

of Urgel, by intermarriage with the House of Foix, transferred to France some claim to overlordship in Andorra. For seven hundred years Andorra, nominally under the protection of France and Spain, has kept her freedom by playing off one against the other.

Andorra is governed by a President, or Syndic, and a Council of twenty-four members; it has no written laws and crime is rare. Every head of a household has a vote, the country being divided into six electoral districts, corresponding to the six important villages. France and Spain each appoint a *viguier* who collects the annual tribute, and each *viguier* in his turn appoints a *bayle*. Criminal cases come before the *viguiers*, but petty civil cases are dealt with by the *bayles*, who exercise judgment by the aid of common sense, custom and precedent.



The gateway to Andorra: approaching Soldeu from the French frontier.

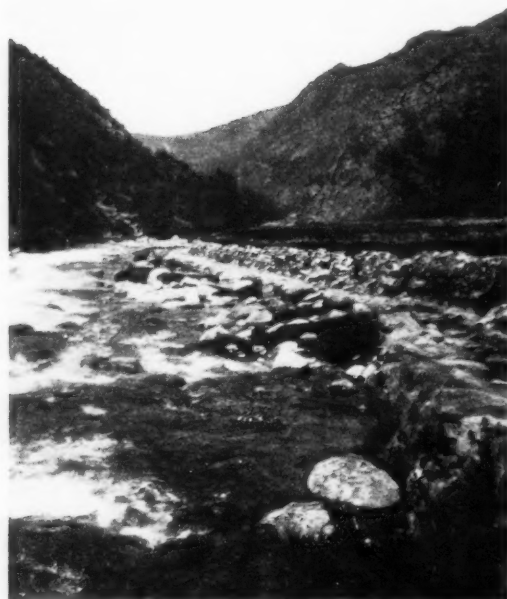
The country has very light taxation, no national debt, and all state offices are unpaid.

So much of Andorra and its history you may learn from any guide-book, but once you travel in that country you forget the guide-books, and this is what the name Andorra now recalls to me: clean air and a great silence, for the roaring of the River Valira is so insistent night and day that it may hardly be distinguished from the monotone of silence; a narrow gorge where mountains are always interfolded ahead of you, luring your imagination; a little breeze making waves of light and shadow on the barley in high niches of some mountain; dark fir trees clothing the upper slopes, in serried ranks, hoarding their own shadows and their secrets; other mountains grey and barren and austere; nightingales singing all day in the box and hazel of the valleys; flowers everywhere, from the cobalt blue Pyrenean gentian on the heights to brilliant meadow flowers, purple thistles and blue columbine, *Thalictrum*, yellow *Trollius*, golden *Arnica*, sweet-scented *Gymnadenia*, *Anemone sulfurea* with cups of palest yellow; and always, overhead, looking down into your very foot-prints, mountains shutting out the world.

To-day the freedom of Andorra is inviolate; but what of the morrow? About twenty years ago France



The Gorge of La Massana; rock buttresses seem to bar the way onward.



An Andorran highway: in the valley between Soldeu and Canillo.

built a road in from the east to Soldeu; Spain retaliated by making a road from Seo de Urgel to Encamp; the country between Soldeu and Encamp, a distance of three or four hours' walk, was traversed only by a stony mule track. Then some four years ago Spain acquired water-power rights on the Valira and the Valira del Norte and began to build power stations above Escaldas and at Sispony, a hamlet lying in the valley that leads to La Massana; in return for this concession she undertook to construct the new road from Encamp to Soldeu. Even with five hundred men at work progress was slow; they would carry away a few stones here and there in wicker baskets; they would load a boulder on to a flat wooden tray harnessed to a mule and then curse the animal into activity; blasting rock and rolling debris into the foaming river they advanced slowly up the valley. Now, with this new road the sound of motor horns will break the silence of the country, tourists will destroy the simplicity of the people, the isolation of Andorra is surely doomed. For it was her isolation that preserved her independence.

There are several ways of entering Andorra; it is curious how writers always speak of entering the country, as if it were a citadel; there is no question of going or arriving there. If you are old, idle, or unadventurous, you will enter by motor bus from Seo de Urgel, having

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reached that place by motor-bus in about two and a half hours from Puigcerdà, and Puigcerdà by train from Perpignan, Toulouse, or Barcelona. If you are a climber or are quite indifferent to the risk of losing your way and spending a night or two on the mountains, you will choose one of the northern passes leading from France into the Ordino valley, or the Port de Fontargente leading into the Vall d'Incles. We took the middle course and came in over the Col d'Envallira from the east, which entailed nothing more than a five or six hours' walk from Porté to Soldeu, a walk by no means level, since Porté stands at about 5,000 feet, the Col at 8,000 and Soldeu just over 6,000. Every yard

of that walk was wild and beautiful; the boundary between France and Andorra, a solitary stone hut by the side of the stony road among the stony mountains, gave us never a welcome of black coffee, never a sign of gendarmerie or customs. This highway, although rough, is a motor road; it has been engineered with hairpin bends. About the middle of June snow melts from the top of the pass, and the postal motor van begins its summer service from Porté to Soldeu. The mountains round the Col are grand and rugged, and the Cirque de Pessons opens out on the left during the descent; in some lake between the crags of that cirque the River Valira has one of its many sources, and this torrent, white and green and turbulent, will be your companion throughout the journey down to the Spanish border and on to Seo de Urgel.

The Andorran villages are much like those of Switzerland, leaving an impression of cobble-stones, timber, manure, and deep shade in the narrow streets. Every village is merged in its background by protective colouring. Each dwelling-house has a stable on the ground floor, and by climbing a dark staircase you come to the living-room, large, cool and scantily furnished; there you may see an open hearth and cooking utensils, a couple of benches and a table, perhaps a chair or two, a crowd of small-featured children and finally a woman, kerchief on head, in whose grey eyes you may find an understanding of all the questions that Life has hitherto



Among the crags of the Cirque de Pessons rises the Valira, the chief river of Andorra.

declined to solve for you.

The Andorran is wiry in physique, not tall, but well-made and active as a cat. Everyone wears *alpargatas*, string-soled shoes adapted to the stony mule tracks that for centuries have been the high-roads of the country. Anyone wearing these slippers will never notice the flatness of the heels until they return to made roads, and then will come an evil hour as they discard their new friends in exchange for stiff old leather shoes.

Canillo, the next village down the valley from Soldeu, is one of the most primitive. In a small beerhouse or coffee-tavern—call it what you will—we ordered an omelette and awaited our fate. In about forty minutes,

long before the omelette was cooked, a gang of road workers came in, rubbed their hands with soap and towel at the end of the room, and sat down at our table to a hearty meal of soup and goat's meat and potatoes. We sat there watching every face and gesture, but their talk was a torrent of Catalan words that had for us no meaning. It is impossible to describe in one epithet the features of the Andorran. Perhaps no definition would skim the truth more closely than the conception of the Andorran as a tool designed by Nature for working in his own peculiar country.

A walk of an hour and a half from Canillo brings you down to Encamp; another hour's walk will bring you to Escaldas, which is the best centre for seeing the country, providing also several hotels with as much comfort as a plain traveller should desire or demand. Thence are made long expeditions up the valleys of the Madriu and the Perafita, deep, solitary, unpeopled gorges where rock and stream and fir trees and some few pastures are alone with the falling and the melting snow, the pageant of the seasons, the threat of wind imprisoned in ravines, the harmony of sunshine falling from above.

And then, on the right bank of the Valira, is the valley that leads to La Massana. Every highway in Andorra is little more than the bottom of a gorge, but for the most part there will be on one side or the other some strip of cultivated land, and for the greater part of the

journey some light will fall upon you from the right hand or the left, and sometimes you may even see a mile or two ahead. But in this gorge of La Massana you are imprisoned with a roaring torrent for your close companion; rocks tower above your head on either side; your trail is but a few feet higher than the river, and all the time, as you look back or forward, interfolded buttresses of rock appear to cut off your advance or return to another world. Louis le Débonnaire must assuredly have known that valley. The path rises into meadows before it reaches La Massana, and thereafter mounts by an easy gradient to Ordino, Ansalonga, La Cortinada, Llorts and La Serrat, whence you can look up to the pass that looks down into France. Or, following a north-western valley from La Massana and passing Ertz, you may climb to Pal, most lonely of hamlets, set in a fertile hollow of the mountains.

The Way Into Spain.

Your last day's walk from Escaldas to Seo de Urgel will take you through Andorra la Viella, most squalid and also most historic of all the villages, with its Casa del Valls or Parliament House; past Santa Coloma with its lovely church reminiscent of Byzantine influence; through San Julian de Loria, prosperous and without charm. Gradually the gorge widens, the enclosing mountains are lower, cultivation replaces rock; you pass the gendarme at the frontier and you come to Seo de Urgel set in a fertile plain; the many-coloured foothills of Spain are before you, rising until the Sierra del Cadi stands like a bastion against the sky. Behind you lies Andorra, locked within its rugged boundaries.

Seo de Urgel is a city of priests and soldiers, of noise by night and day, a city of many memories with an ancient Romanesque cathedral where the devil himself would surely fall into an attitude of worship, for the atmosphere in those dim aisles and about those massive pillars is still devotional, untouched by any breath of the world. Here, as you wander in those medieval aisles, arcaded streets and cloisters, you may look back upon your journey with discerning eye.

It has been said that Nature shows no mercy in Andorra, and, indeed, there is about this small republic something withheld and baffling, and the country has more power than charm. Yet it will linger in the memory when many things more fair have been forgotten. You cannot forget what you have seen in that citadel of Nature, and over and over again you find yourself dreaming about the valleys of Andorra, the gorges that you never followed, the mountain hollows where you never penetrated, the peaks you never climbed.

Correspondence.

Science and Religion.

To the Editor of DISCOVERY.

Sir,

If I was surprised that my request to see proof of your original comments was not acceded to, I was even more surprised to find portions of what I intended as a personal letter printed in your July Notes of the Month. These, however, are minor matters; but I must protest once more against your twice-repeated charge of dogmatism. Any apparent dogmatism in my article was, I repeat, necessitated by exigencies of space. It is not dogmatic to make assertions if these are supported by evidence, and this support is what I have attempted to give in my book mentioned in my previous letter.

In addition, I never made the statements you attribute to me, that "all religion which acknowledges a Higher Power than man is a superstition," or that "belief in God is incompatible with a scientific approach." My statement was that God was a hypothesis, perfectly natural and reasonable in a certain stage of human evolution, but that this hypothesis was now losing its value. I further stated that God (in the accepted religious sense, and not in the guise of a mere philosophical principle, of no immediate practical or psychological service to the worshipper) is gradually fading away as the result of the growth of science. This seems to me, far from being dogmatic, to be a quite reasonable statement of an observed trend.

A simple method of seeing whether I am right or not would be for you, Sir, to ask the readers of *Discovery* to answer a series of questions on the subject. I would suggest the following:

1. Do you believe that God interferes with the natural course of events by performing miracles which are not explicable on ordinary scientific principles?
2. In the light of our knowledge of physical science, do you regard it as intellectually legitimate to pray to God to alter the course of physical events—e.g., prayers for rain?
3. Do you regard it as intellectually legitimate to pray to God to alter the course of human affairs—e.g., prayers for victory in war?
4. Do you regard it as necessary to postulate the constant activity of God to maintain the processes of nature, as was done, e.g., in regard to the course of the planets in pre-Newtonian astronomy?
5. (a) Would you agree that the Devil has almost entirely disappeared from the theological scheme of educated people? And if so (b) do you believe it more necessary on scientific principles to postulate God to account for the positive values, e.g., goodness, than to postulate the Devil to account for, e.g., evil?
6. After the general acceptance of the Darwinian principle of Natural Selection, is it scientifically necessary, or desirable, to postulate a Divine purpose to account for the apparent purpose seen in biological adaptation and evolutionary progress?
7. (a) Would you regard it as legitimate to say that the advance of scientific knowledge has made it impossible to think of God as interfering with events on the physico-chemical or general biological level? (b) If so, what remains the functions of a personal God except in relation (i) to creation (ii) to human psychological processes?
8. Is it scientifically necessary, or desirable, to postulate God as creator, when so far as we can see, the origin of the universe is outside the range of scientific discourse?
9. In view of the recent advances of psychology, do you

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consider that such phenomena as conversion, mystic experience, etc., can be explained on naturalistic grounds, or demand the intervention of God or other supernatural being?

I should imagine that the majority of your scientifically-trained readers would answer "no" to questions 1, 2, 3, 4, 5b, 6, 8; "yes" to 5a, 7a, and 9; and "nothing" to 7b. And if so, it would be perfectly fair to say that God was fading away, since in earlier ages the reverse answers would have been given.

Such a questionnaire would be a perfectly legitimate scientific procedure, and I hope, Sir, that you will organise such a project. Until you do so, your doubt that most scientists share my views is even more dogmatic than my assertions.

Let me end by making myself quite clear. I maintain that the current educated conception of God, until the rise of modern science, was of a personal ruler capable of interfering with and altering the natural course of events, physical, biological and psychological, and of entering into a compact, or at least a simple personal relation, with His worshippers. I also maintain that now the current educated conception is, at its maximum, of a much more shadowy Being, who is presumed to have created the world, to be in some way the source of values, and to be involved in certain phenomena of religious psychology. If this is so, I further maintain that the change is largely due to the advance of science, that it is likely to continue further, and that it constitutes a fading of God.

Yours faithfully,
JULIAN S. HUXLEY.

King's College, London.
20th July, 1934.

[Every editor must reserve the prerogative of printing his own comments on any article without showing a proof to the contributor. In this case we did not dispute Professor Huxley's right to his views but only his method of stating them. We feel sure, however, that his latest letter will be of the greatest interest to all our readers, whatever their shade of opinion. Professor Huxley claims that space, the continual bugbear of both author and editor, prevented him from stating his case to the best advantage. We are now delighted to give him the opportunity of defining his standpoint more clearly; his searching questionnaire will, we hope, give our readers cause to reflect, and to let us know their own views according to their several modes of thought.—Ed.]

To the Editor of DISCOVERY.

Sir,

We learn our religion as we learn the civilisation of which it is a part, by precept and example, that is to say, by suggestion. It is fear of the counter-suggestion which causes both religious and political intolerance and persecution, without a certain amount of which neither would long survive.

Both are ways of living and thinking, customs of thought and action, and are related, not to the truth, but to utility. They are useful as bonds of union which help us, through bias, to think and feel and act together and therefore to survive.

Science must put up with the intolerance of religiously minded people when she ventures on a counter-suggestion, however rational it may be. *Tout comprendre c'est tout pardonner.*

Yours faithfully,
RICHARD KAY, M.B.

Hartland, N. Devon.
9th August, 1934.

To the Editor of DISCOVERY.

Dear Sir,

Professor J. B. S. Haldane writes in his article in your February issue: "It would be truer to state that recent work by emphasising the complex properties of the simplest units of matter has made materialism far more plausible than was the case ten years ago." In this he is combating the ideas "that science has hopelessly discredited materialism, and that the creation of the world or of life is implied by the data of astronomy or biology."

There is every reason for the scientific method of plotting out the universe on its mechanistic side, but when scientists leave the impression that there is only this side: that unless "Science" can discern God with apparatus, and bring Him up to the touchstone of scientific criteria He does not exist (or if He does exist, He is the bond-slave of His own mechanism), they are doing humanity a grave disservice. This is the poison-gas that has greater potency than any mustard-gas of war-time.

Is it possible that someone expects Science to discover God? Is there one trembling soul who will be relieved in mind if Science will stretch forth its human hand to steady the Ark of God?

Science is of human origin, and is human in its methods, outlook, basis, purpose. It asks one question regarding all physical phenomena (and it deals with physical phenomena only), and that is, "How is it done?" Even if, as Dr. Joseph Needham thinks, it is "unwise to suppose that the forward march of the mechanistic conception of life can be arrested even at the confines of the mind," the work lies still with the material side of phenomena, that which can be apprehended with the senses of men, and no more. We are still "faced with the problem of evolving intellect and will from unconscious mechanism, a task to which, as is generally recognised, the ingenuity of Herbert Spencer himself proved inadequate."

A religion vouched for by Science essentially human in origin, would be just as much of the earth, earthy, as the ancient Greek mythology. A God that measured up to "scientific criteria" would be a humanly constructed god, one to be viewed with suspicion as deep and profound as we now view the equally human Zeus or Moloch.

A similar criticism holds in regard to the god of what is too often assumed to be religion, even a religion that has long left behind it, in theory, Zeus and Moloch and the countless others in the human pantheon. However well it is started off, humanity eventually brings its "religion" down to human levels with a similar humanly constructed god. Men have very zealously made idols, and whether they could be classified under "science" or under "religion," or any other heading is of little consequence.

It follows that the "God-that-is" must be a self-revealing God, Who, though His ways are higher than our ways and His thoughts than our thoughts, yet holds the compass-needle of our minds and spirits steadfastly pointing to Himself. We may admit or deny the self-revelation, as we please, but without it we are without the knowledge of the true God. With that self-revelation admitted, the same spirit of sincere enquiry, the same searching after reality governs us in the things of the spirit as in the things of the senses, even if the methods necessarily vary. There can be no conflict between this "religion" and this "science," since both are of the one God.

Yours faithfully,
JOHN HINDMARSH.

16, Holland Road, Sydney, Australia.
12th June, 1934.

The Anthropological Congress.

From Our Own Correspondent

THE first session of the recently instituted International Congress of Anthropological and Ethnological Sciences, which met under the patronage of H.R.H. the Duke of York and the presidency of the Earl of Onslow at University College, London, in July and August, was conspicuously successful in both its scientific and its social aspects. The work was allocated to eleven sections, each concerned with a department of study. In the preliminary programme questions suggested for discussion had been formulated, and in most sections these had been followed. In consequence, a striking and most useful feature of the programme was the number of inter-sectional discussions.

The Aryan Myth.

Sir Grafton Elliot Smith's opening remarks as President of the Section of Anatomy made a timely reference to the extravagant and scientifically unsound claims that are being put forward on behalf of the Aryan peoples. He pointed out that whatever view might be held as to the place of origin of civilisation, whether in Egypt or Mesopotamia, there could be no question as to the contribution of the Aryans to the origin of culture in Mesopotamia, whence they could only have borrowed; while Max Müller himself had been forced to admit under Huxley's attack, that "Aryan," being purely a linguistic term, had no racial connotation, and the classification of an "Aryan race" was meaningless. On the difficult question of the relation of race and culture which is fundamental in the conflict of opinion between the German view and that of the majority of anthropologists, it cannot be said that the Congress has contributed much; but a research committee has been appointed to consider the whole problem of race, which will report in due course. One aspect of the problem was discussed in the Psychological Section by Dr. C. S. Myers, who held that while it had not been found that there was much difference between primitive man and his more advanced brother, such differences as there were fell within the field of the social psychologist. It may be noted that on the whole his view would seem to militate against that of "Nordic" superiority.

A discussion important for methods of racial discrimination was initiated by Professor V. Suk of Brno. This dealt with the value of the blood groups in anthropology. When it was discovered that blood groups—that is, the reactions of the blood in transfusion—differed not only as between individuals but as between races, and that the manner of reaction was inherited

as a unitary character in accordance with the Mendelian laws of inheritance, it was anticipated that a ready means of determining racial character would be available. This expectation had not been fulfilled. Some half a million observations, somewhat unevenly distributed, are now available; but as Professor Suk showed in a survey of the evidence, and, more particularly, of recent developments, the results do not as yet warrant correlation with other traits to represent a criterion in racial classification. In other words, the evidence of the blood groups does not conform to the conclusions of the anthropologist as to racial affinities. Professor Ruggles Gates, however, was more hopeful of success in the interpretation of results, and suggested that, for example, the somewhat anomalous position of the blood grouping of the American Indians, who show none of the characteristics of the Mongolian from whom the anthropologist derives their descent, might be due to their derivation from Eastern Asiatic islands such as Formosa, etc., where the inhabitants show an analogous grouping.

Miocene Man.

Dr. L. S. B. Leakey's discoveries of very ancient examples of modern man and of a direct ancestor of modern man in East Africa may be expected to react on the views now held as to the date of man's differentiation from the anthropoid stock. Some indication of this was afforded by the discussion of man's relation to the primates, which was initiated by Professor Le Gros Clarke. He pointed out that while it was generally accepted that man's origin had taken place relatively late in Miocene times in the group of fossil apes known as *Dryopithecus*, which was also the direct ancestor of the modern African apes, recent discoveries, such as those of Dr. Leakey, go to show that the human stem had become segregated at a much earlier stage, and that the modern anthropoid apes were already fully differentiated by the beginning of the Miocene. On the other hand, Mr. A. T. Hopwood's examination of the palaeontological evidence associated with the early types of man not only ranged them in a somewhat unusual order of dating, in which Piltown man heads the list before *Pithecanthropus* of Java, but in suggesting that man is to be associated with the western rather than with the eastern group of fossil apes, lends support to the view that the place of origin of man is nearer the west than the east. This would support the views on the African origin of man put forward by Dr. Leakey.

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The Norwich Cathedral Paintings.

By the Very Rev. the Dean of Norwich.

Dr. Cranage describes the wonderful display of English 13th Century art on the walls and vaults of Norwich Cathedral, of which the revelation has been made possible by the skill of Professor Tristram and the generosity of the Friends of Norwich Cathedral. The paintings are among the best works of the greatest period of English medieval art.

A CONSIDERABLE part of the walls and vaults of Norwich Cathedral has been painted from time to time. The earliest paintings date from about 1180-90, and of these the most remarkable are in one of the eastern bays of the south aisle of the Nave. These have been recently treated by Professor Tristram, who, after cleaning off the whitewash and dirt, used a wax preparation, helped by radiant heat, which revived the colours in a wonderful way, and fixed them so that will probably last another hundred years. There are three medallions in this place, evidently portraying incidents in the career of the founder, Herbert de Losinga, Bishop from 1091 to 1119.

These paintings are of great interest and of real beauty, but they are far surpassed as artistic achievements by those in the north aisle of the Presbytery. The bridge over this aisle, built about 1275 and extended about 1420, was a chapel in itself and led to another chapel on the north side, long destroyed, where the relics were

kept. When the bridge was first made, a reredos was placed on its east side, the marks of which are clearly shown on the Norman arch in that position. The reredos has long disappeared, and most of the paintings around it, but one beautiful fragment, a censuring angel, remains on the south side. This has been revived by Professor Tristram, who puts it down to the same date when the bridge itself was made—i.e., about 1275.

Some forty years later a great scheme was carried out on the early vault and the Norman arch on the west side. The central figure is our Lord in Majesty, and from it a vine comes out with ramifications all over the vault to include the saints represented. On the west side is the Virgin and Child, with St. Margaret on the right and St. Catherine on the left. The west compartment of the vaulting is

taken up with three noble figures, St. Peter, St. Andrew and St. Paul. The north compartment shows St. Nicholas, patron of merchants and sailors and of boys, especially orphans. On one side is St. Richard, the saintly Bishop of Chichester, 1245-1253, and on the other St. Martin, 371-397, who gave his cloak to the naked beggar. The south compartment is not so clear, but it probably shows St. Thomas of Canterbury, murdered in 1170, St. Edmund the King, shot to death by the Danes in 870, and St. Laurence the Deacon, who was broiled to death in 258. The Norman arch has twelve figures round it, no doubt the Twelve Apostles.



St. John the Evangelist, one of the Apostles around the Norman arch.



St. Richard of Chichester, in the north compartment of the vaulted roof.

Book Reviews.

Scotland in Ten Days. By J. J. BELL. (Harrap. 5s.)

Mountain Days in the Isle of Skye. By J. E. B. WRIGHT. (Moray Press. 12s. 6d.)

Wade in Scotland. By J. B. SALMOND. (Moray Press. 5s.)

It is to be supposed that the number of persons in this country who are unable to read a map is growing. At any rate the practice of publishing travel books without adequate map equipment is regrettably on the increase; none of the three books here under review, though all are excellent in their several ways, has more than a makeshift in the way of maps. It cannot be a question of expense, for the *Blue Guide to Scotland*, which is no more costly than the most expensive of these books, has a full complement of maps, and Mr. H. A. Piehler, in *Scotland for Everyman*, has shown what can be done at a lower charge. So we must fall back on the first explanation—that these books are intended for those unhappy beings who simply have no use for a map.

Mr. Bell infuses his rapid survey of Scotland with his own inimitable personality—vivid, humorous, and observant—with the result that the book is pleasant and tempting to read. We could have wished for fewer particulars in the way of time-tables and prices, for this is presumably not a guide-book destined to appear, duly revised, at regular intervals. But it is impossible to have too much of Mr. Bell's descriptive writing. His account of St. Andrews, a city chosen purposely as unvisited by the reviewer, makes the old streets and colleges stand out in clear perspective against their background of history, and has decided at least one reader to repair the omission of a visit to it as soon as possible. The photographs are well reproduced, the Highlands being treated with more originality than the Lowlands. Columbia for Columbia, on p. 185, is a misprint that we might

have been spared; and as to the one map, further comment is unnecessary.

Mr. J. E. B. Wright, who for ten years has been the head mountain guide of the English Lake District, writes of the Coolins with affection and intimate knowledge. His intrepidity in the face of the hideous uncertainty of mountain weather and the imminent danger of death threatened by rotten rock and untrustworthy handholds, seems almost criminally casual to lesser mortals; and his descriptions of difficult ascents across rough gabbro slabs tilted at uncomfortable angles—the more uncomfortable the better—can be easily followed by the un-instructed. He, too, is prepared to risk his neck on the mountains without a map—he admits it himself—and all he provides for the learner is what the French call a *topo-guide*, showing the

general lay-out of the Black Coolins. The chapter on the rescue of O'Grady by night is all the more thrilling because of its deliberate understatement; and the author shows a proper appreciation of the Hebridean views from the mountain tops—and indeed they are like nothing else on earth. He has a few difficulties with the Gaelic (but what Sassenach has not?) and the pronouncing glossary is pretty useful for general purposes. The photographs are magnificent, especially the view of the Waterpipe Gully; they might perhaps have been more clearly reproduced.

In a pleasant sketch of the life of General George Wade, with special reference to his work in taming the Highlands, Mr. J. B. Salmond gives us a realistic counterpart of Neil Munro's *The New Road*. Perhaps the most remarkable feature of the book is the way in which Wade's personality stands out. His English honesty and efficiency, at a time when too few Englishmen were honest or efficient, was tempered by his Irish tact and charm; so that among a race which includes the proudest and most sensitive of mortals he left no enemies except



Simon Fraser, twelfth Baron Lovat (after Hogarth), whose intrigues play an important part in "*Wade in Scotland*."

Discovery

Simon Fraser, twelfth Baron Lovat, who has been a Scotsman who appeared in 1724 was a field-officer. How he and set it and clear on the descriptions, lure the trodden, prospect, not to be

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Simon Fraser, Lord Lovat, who was an exception to every human rule, and was certainly neither proud nor sensitive. Little love has been lost between Scotland and the Hanoverians, but Scotsmen may well spare a kind thought for King George II, who appointed Wade as a suitable man to enforce the unpopular Disarming Act. As the author points out, the Highlands in 1724 were as much a prey to racketeering as Chicago to-day, and Wade's position would be much the same as that of a British field-officer appointed to suppress gangsterdom in America. How he appreciated the situation at once, suggested a remedy, and set it going after ten years of unremitting toil, is told plainly and clearly by Mr. Salmond. An interesting sidelight is thrown on the character of that unmitigated ruffian Rob Roy. Descriptions, ancient and modern, of the passage of Wade's Road lure the traveller to follow its path, for many miles now scarcely trodden, and the illustrations add to the attractiveness of the prospect. The sketch-maps, though showing little detail, are not to be despised.

Earth, Radio and the Stars. By H. T. STETSON. (McGraw-Hill. 10s. 6d.)

Dr. Stetson has written a book about the great problems of Physics, Geophysics, and Cosmogony and their applications in really popular language. He is content to give an account of the leading theories of the day without any personal bias, so describing them that the layman can choose those that catch his fancy most and will be sure to find readable and entertaining information. In fact, the great point in favour of this book is its readableness; the text is not as full of puzzling words and equations as is so often the case with descriptive scientific works of the kind. The chief theme that has engaged the author's attention is the omnipotent influence of the sun on affairs, physical and otherwise, in our own planet.

What is the Fourth Dimension? By C. W. R. HOOKER. (A. & C. Black. 5s.)

Mr. Hooker's book is excellent in intention and interestingly written, but it is too scattered in point of view to be the book it might have been. It has a solid core of science, ably expounded, with a surround of interesting but often irrelevant talk, and a title that is quite an unfortunate choice. The subject it inquires about is not, in fact, the main subject of the book but a minor one, and the inclusion of this minor theme has done the book no good. To tell an author of a book with the above title that he would have done better to have eschewed the fourth dimension altogether seems strange criticism, but the real subject of this book is asymmetry in Nature, a good subject, of which the general reader has been told little, and one that never had ought to do with dimensions more than three.

Asymmetry in Nature is rooted in the chemistry of carbon compounds, especially in the ideas which the Dutch chemist van't Hoff and the French chemist Pasteur gave to the world. There are simple compounds like glucose and lactic acid whose molecules are known to be so arranged in three-dimensional space as to have two distinct forms. They differ in their geometrical configuration only. They are related as the right hand is to the left, or as an object is to its image in a mirror. Otherwise they are extraordinarily alike. This asymmetry becomes of increasing importance in the more developed fields of biochemistry and is quite literally of vital importance in physiology. In eight chapters Mr. Hooker develops these themes interestingly.

His exposition and diagrams are often clearness itself. He shows how an asymmetric living world is markedly more efficient than a symmetric one, a subject which is important and fortunately unhackneyed. By generalising at large and seeking out analogies the author shows how the lessons learned in the simple science of biochemistry may be applied in other sciences such as biology and astronomy, and in the great world of life generally. The two last chapters on quality and quantity, and on the fourth dimension and religion, have little relation to the others, but they are interesting essays in themselves. The strong point of the book is the clearness of the exposition of the scientific facts; the weaknesses are the continual harping about a dimension which is unknown to science, existent, no doubt, in the minds of the fanciful, and a facetious tendency to appear flabbergasted by cryptic utterances and mathematical symbols.

The Home of the Monk: an Account of English Monastic Life and Buildings in the Middle Ages. By the VERY REV. D. H. S. CRANAGE, Litt. D., F.S.A., Hon. A.R.I.B.A., Dean of Norwich. (Cambridge University Press. 6s.)

It is to be hoped that the demand for a third edition of Dr. Cranage's admirable little book indicates a wider and more intelligent interest in the monasteries of the Middle Ages and is not merely the meed of good craftsmanship. The subject is one of extraordinary fascination. For one thing the remains are almost always found amid the most attractive surroundings: in a romantic Yorkshire valley like Fountains, or, like Wenlock, in Dr. Cranage's beautiful native Salop, or perched on a strategic site like Durham—"half church of God, half castle 'gainst the Scot"—or in the peaceful cathedral precincts of a busy town like Norwich, or in the weird loneliness of the Fens or the wooded solitudes of the New Forest. And then, too, there is usually just enough left to excite our interest and yet much that is obscure enough to exercise our ingenuity.

But perhaps to many the great charm of the religious house is that, lovely as the architecture is, it has not merely the loveliness of art but an additional human interest in telling us how the monk lived. It is here that the Dean's book is so invaluable and it is for this reason that it should be in the hands of every holiday-maker who has any love for these things. Much as we wish to see how the monk worshipped, and this the Dean briefly and lucidly expounds with illustrative references to the Abbey at Tintern and other great churches, we want also to picture how he passed the rest of the day. We like to know about the "turn," that queer crooked hole through the wall, through which beer could be passed to the thirsty brother without either party seeing the other. We must have another hunt for that of which the Dean recognises remains at Winchester. (It has always seemed to us, by the way, that there was not a little unnecessary mystery about this harmless pint, which, we suspect, was always brewed very small.) There are half-a-hundred other little trivialities which those endowed with proper curiosity love to pry into. We want to know where and how the monk read, dined, and slept, and all this our author tells us. In the Dean's own cloister at Norwich there is a wide doorway to the dormitory staircase. It was blocked when the house was suppressed, but not only do the hinge-hooks on each side tell us that there was a pair of doors, but two or three of the remaining steps, worn on one side and perfect on the other, show that one door only was used, the other being kept shut. It is now close on four hundred years since that door was used and sandals trod those steps, but we are able to "Sherlock" this detail of old times.

But this is trifling. The larger monastery was really a very great affair planned on a grand scale. The frater, the guest halls, the large and complex farmery buildings, the magnificent gateways, of each there are noble examples which shame us of a smaller day by their size, their massive and skilful construction, their beauty and their poetry.

The book has some beautiful views, good typical plans of the different Orders, a very useful bibliography and an adequate index.

The Kinetic Theory of Gases : Some Modern Aspects. By MARTIN KNUDSEN.

The Adsorption of Gases by Solids. By S. J. GREGG. (Methuen. 2s. 6d. each.)

The account of the substance of some lectures delivered by Professor Knudsen at the University of London in 1933 begins with a general outline of the kinetic theory, divided into four fundamental assumptions, and approached from a mathematical point of view. The remainder of his book is a description of the author's own experimental methods as used in his investigations along certain lines, together with his views on the results obtained and their bearing on the theoretical side of the question. This record cannot and does not pretend to cover anything more than a few selected problems; but those described are dealt with lucidly and have the advantage of being reports of new and original work and conclusions.

Briefly described, Dr. Gregg's little volume is an introduction to the general literature of the subject for advanced students in the specialised branch of Physical Chemistry indicated in the title. The author has dealt with both the practical and theoretical sides of the subject, illustrating them with figures and the necessary mathematical approaches, which every student who contemplates either a cursory or a more detailed survey of this branch of study should understand. The author is to be complimented on a very good bibliography, given chapter by chapter; and on an excellent index in which the names of workers are printed in capitals. The first parts of the book are concerned with the conditions under which the phenomena of gas adsorption into solids can be observed, and contain suitable experimental methods. The following chapters deal, among other aspects of the subject, with the laws relating to the heat of adsorption and the theories devised to elucidate adsorption phenomena, and discuss the physical forces at play during the observations; and the book concludes with an account of the chemisorption of gases on metals and carbon.

Essays Presented to C. G. Seligmann. Edited by E. E. EVANS-PRITCHARD, RAYMOND FIRTH, BRONISLAW MALINOWSKI, and ISAAC SCHAPERA. (Kegan Paul. 21s.)

Professor Seligmann's varied interests in anthropology are reflected in the collection of essays which some thirty of his friends, colleagues, and old pupils have contributed to a volume in his honour. In the introduction Dr. A. C. Haddon observes that Professor Seligmann was already well known as a pathologist when in 1898 he joined Dr. Haddon's expedition to the Torres Straits and began the studies of primitive peoples for which he is famous, notably his books on the Melanesians of New Guinea, the Veddas of Ceylon, and the pagan tribes of the Sudan. He is also a psychologist of repute and had much experience during the war in treating cases of shell-shock. Thus the essays in this volume include both pieces of special research and theoretical or historical discussions. In the first category are, for example, Mr. Henry Balfour's account of "The Tandu

Industry in Northern Nigeria," *tandu* being the thin animal membrane out of which flasks and boxes are made; or "Zande Therapeutics," by Dr. Evans-Pritchard, who declares that this Central African people has a large traditional assortment of drugs which are virtually useless for their alleged purposes; or "The Meaning of Dreams in Tikopia" (one of the Solomon Islands), by Mr. Raymond Firth. In the other category, now that China is attracting much attention, Mr. L. K. Tao's paper on "Some Chinese Characteristics in the Light of the Chinese Family" is particularly worth reading. Mr. Tao writes cautiously, but he evidently thinks that the Chinaman's profound respect for his family hampers the development of his own individuality and prevents him from co-operating heartily with men of other families. "Too much emphasis on family life brings with it an accentuation of kinship over other social and broader interests." China, to put it differently, is a congeries of families, but not a nation capable of acting nationally. Princess Marie Bonaparte, writing on "Psycho-Analysis and Ethnography," stresses the importance of investigating the primitive peoples that yet remain before they disappear or become semi-civilised and forget their old customs; a century hence it will, she thinks, be too late. Dr. R. R. Marett discusses anew the old problem of "Food Rites," concerning which he rejects Miss Jane Harrison's theory of totemism, sacrament, and sacrifice, while Professor J. L. Myres has an attractive paper on "The Roman Plebs and the Creation of the Tribunes," in which he contends that the tribunes were to serve the proletariat as its patrons just as the heads of the patrician clans looked after their dependants. Anthropology, it will be seen, covers a very wide range of subjects, so that Mr. R. S. Rattray's attractive specimens of "Hausa Poetry" and Mr. A. M. Hocart's learned but somewhat controversial essay on "Decadence in India" both fall within the scope of this uncommonly readable volume.

The New Background of Science. By SIR JAMES JEANS. Second Edition. (Cambridge University Press. 7s. 6d.)

It is superfluous to do more than call attention to the issue of a second edition of Sir James Jeans' now well-known exposition of the underlying principles and assumptions of research in modern science, and more especially in physics. It is a mark of the widespread interest in this most fascinating aspect of recent thought that a second edition should be needed within twelve months of the issue of the first, and an indication of the rapidity of recent advance in knowledge that Sir James Jeans should have found it necessary to rewrite a considerable part in preparing it for the press.

Blue Blazes : Danger and Delight in Strange Islands of Honduras. By JANE HARVEY HOULSON. (Duckworth. 12s. 6d.)

Miss Houlson has written a vivacious and entertaining personal narrative of an expedition of archaeological exploration undertaken by Mr. Mitchell Hedges on behalf of the British Museum and the Museum of the American Indian, Heye Foundation, New York. A visit of reconnaissance made by Mr. Mitchell Hedges some years ago had suggested that the *Islas Bahía* off the coast of Honduras would repay further investigation. The expectation was fully realised. No fewer than seventeen sites yielded a large number of specimens, consisting of pottery vessels, figurines, stone vases, beads, and axes and tools of stone and obsidian. Although Miss Houlson's book contains no details of direct scientific bearing, it affords an interesting picture of natural and social conditions in these little-known and seldom visited islands.

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